

CALFED REVISED PHASE II REPORT

December 9, 1998

**CALFED Bay-Delta Program
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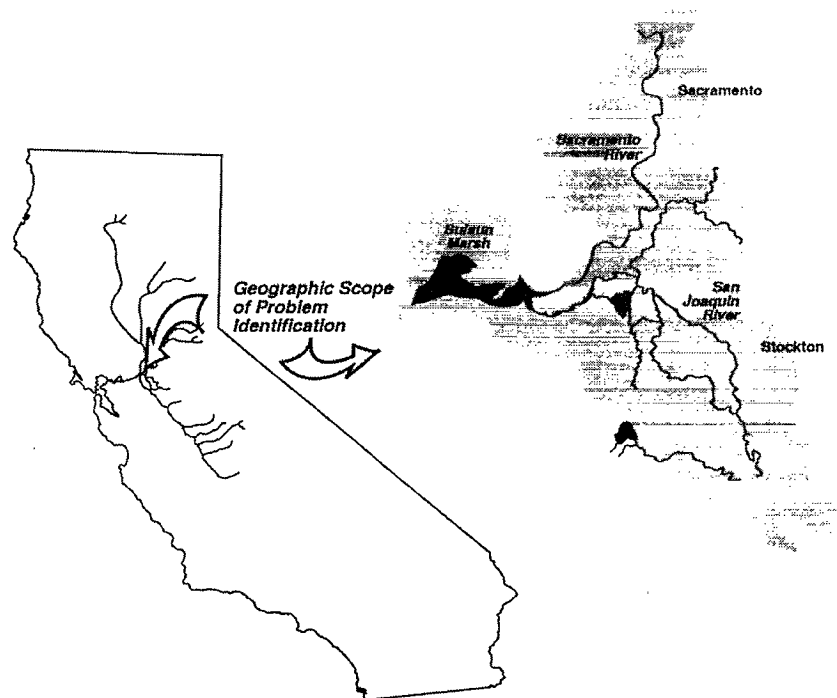
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1. INTRODUCTION

A maze of tributaries, sloughs, and islands, the San Francisco Bay/Sacramento-San Joaquin Delta estuary (Bay-Delta) is the largest estuary on the West Coast. It is a haven for plants and wildlife, supporting over 750 plant and animal species. The Bay-Delta includes over 738,000 acres in five counties. The Bay-Delta is critical to California's economy, supplying drinking water for two-thirds of Californians and irrigation water for over 7 million acres of the most highly productive agricultural land in the world.

The Bay-Delta is also the hub of California's two largest water distribution systems - the Central Valley Project (CVP) operated by the U.S. Bureau of Reclamation and the State of California's State Water Project (SWP). The CVP and SWP were built to provide river regulation, improvements in navigation and flood control, water supplies for irrigation, municipal, and industrial uses, and hydropower generation. In addition, at least 7,000 other permitted water diverters, some large and some small, have developed water supplies from the watershed feeding the Bay-Delta estuary. Together, these water development projects divert about 20 percent to 70 percent of the natural flow in the system depending on the amount of runoff available in a given year.

These diversions, along with the effects of increased population pressures



Geographic Scope for Problems and Solutions

The geographic **scope for the problems** consists of the legally defined Delta, Suisun Bay (extending to the Carquinez Strait) and Suisun Marsh.

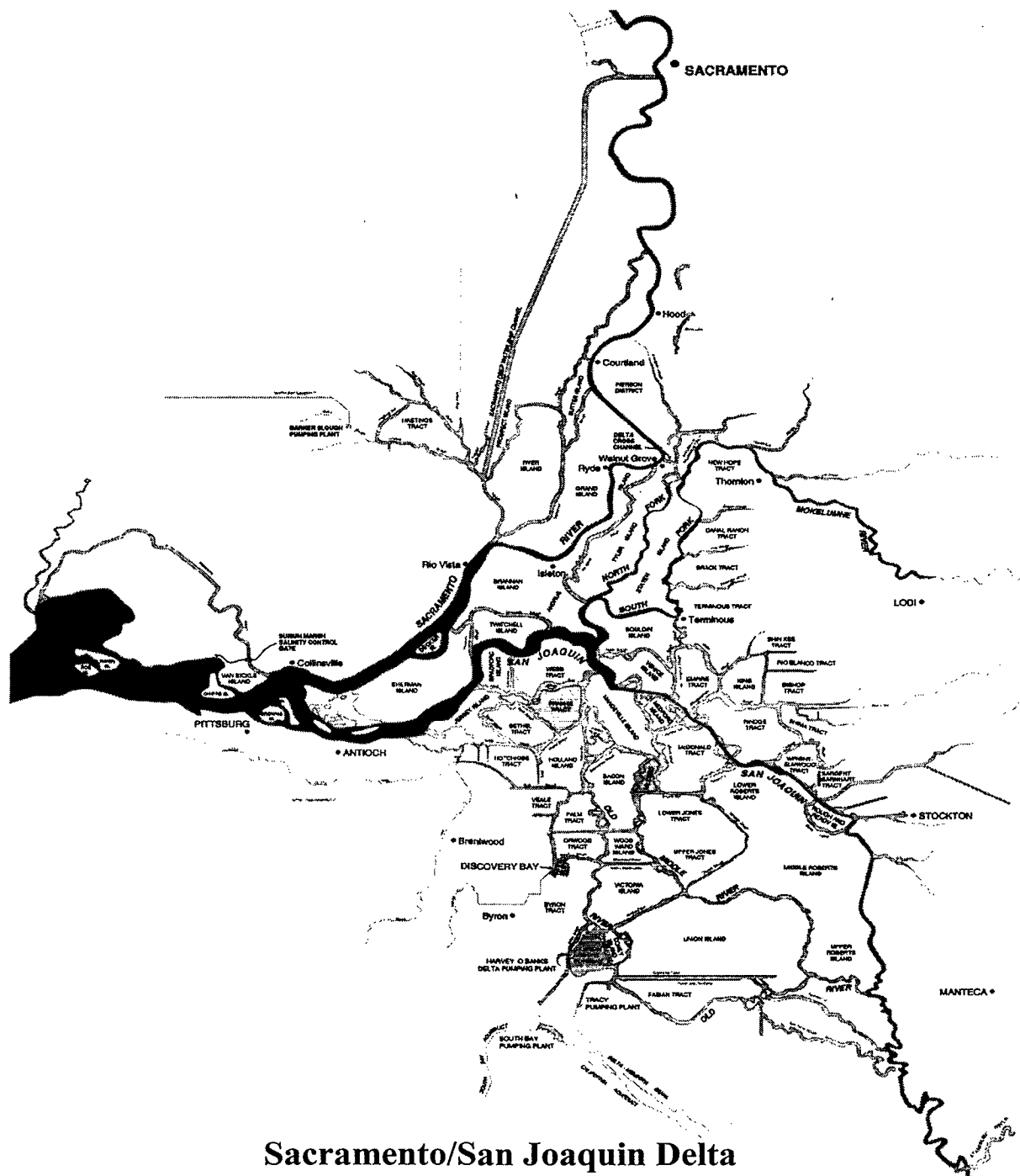
The geographic **scope for developing possible solutions** includes a much broader area that extends both upstream and downstream of the Bay-Delta. This solution scope includes the Central Valley watershed, the Southern California water system service area, San Pablo Bay, San Francisco Bay, and near-shore portions of the Pacific Ocean out to the Farallon Islands and north to the Oregon border, and the Trinity River watershed, from which flows are diverted into the Bay-Delta system.

throughout California, the introduction of exotic species, water pollution, and numerous other factors have had a serious impact on the fish and wildlife resources in the Bay-Delta estuary. This impact, as well as other effects of the continued resource conflicts in the Bay-Delta system, are discussed in detail in Chapter 2.

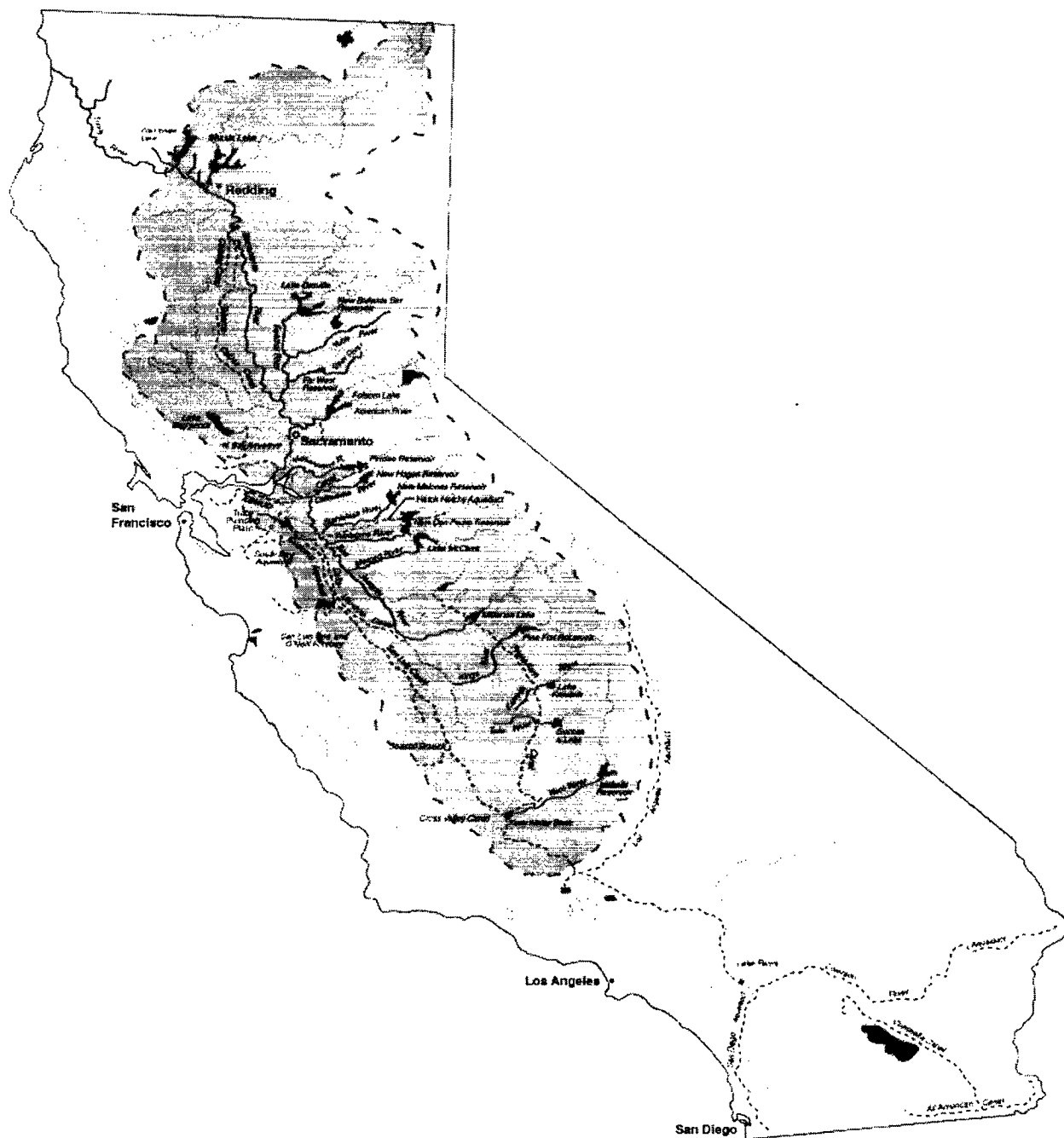
Although all agree on the importance of the Bay-Delta estuary for both fish and wildlife habitat and as a reliable source of water, few agree on how to manage and protect this valuable resource. In the past two decades, these disagreements have increasingly taken the form of protracted litigation and legislative battles; as a result, progress on virtually all water-related issues has become mired down, approaching gridlock.

The CALFED Bay-Delta Program was established to reduce conflicts in the system by solving problems in ecosystem quality, water quality, water supply reliability, and levee and channel integrity. The Program seeks to do this by developing a long-term comprehensive plan that will restore ecological health and improve water supply and water supply reliability for beneficial uses of the Bay-Delta system. The Program has crafted alternatives that improve water quality so as to protect Delta drinking water supplies and improve the quality of aquatic habitat. Maintaining and improving the integrity of Delta levees and channels will protect agricultural, urban, and environmental uses within the Delta and protect the quality of water used elsewhere in the state. Water conservation and recycling programs can assure the efficient use of existing water supplies and any new supplies developed through the Program. **The CALFED mission, objectives, and solution principles shown in the box on page 6 guide how the Program will be implemented.** ~~to ensure that all aspects of the system are improved, together.~~ Carrying out the mission, achieving the objectives, and adhering to the solution principles will ensure that CALFED fulfills its commitment to continuous improvement in all of the four problem areas.

Given the history of conflict in the Bay-Delta system, CALFED recognizes that any proposed program to address this broad spectrum of resources will be controversial. Stakeholders participating in the CALFED process have already identified significant concerns about virtually every component in the Program. CALFED encourages all members of the public to review the material in this report and to provide comments for further consideration.



Sacramento/San Joaquin Delta



Watershed for the Sacramento/San Joaquin Delta

The Program

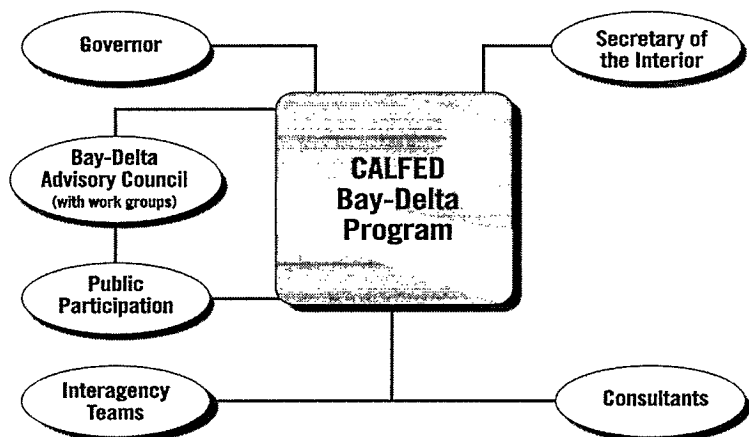
The CALFED Bay-Delta Program began in May of 1995 to address the tangle of complex issues that surrounds the Delta. The CALFED Program is a cooperative, interagency effort of state and federal agencies with management or regulatory responsibilities for the Bay-Delta.

The CALFED agencies appointed an executive director to oversee the process of developing a long-term comprehensive plan for the Bay-Delta. The Executive Director selected staff from the CALFED agencies to carry out the task. In addition, the CALFED agencies and stakeholders worked with the interagency CALFED Program team through multi-level technical and policy teams.

The CALFED Program is a collaborative effort including representatives of agricultural, urban, environmental, fishery, business, and rural counties who have contributed to the process. The Bay-Delta Advisory Council (BDAC), a 34-member federally chartered citizens' advisory committee, provides formal comment and advice to the agencies

CALFED	
<u>State Agencies</u>	<u>Federal Agencies</u>
Resources Agency of California*	U.S. Department of Interior
- Department of Water Resources	- Bureau of Reclamation*
- Department of Fish and Game	- Fish and Wildlife Service*
	- Bureau of Land Management
	- U. S. Geological Survey
California Environmental Protection Agency	U.S. Army Corps of Engineers*
- State Water Resources Control Board	U.S. Environmental Protection Agency*
California Department of Food and Agriculture	U.S. Department of Commerce
	- National Marine Fisheries Service*
	U.S. Department of Agriculture
	- Natural Resources Conservation Service*
	- U.S. Forest Service
	Western Area Power Administration

* Co-lead agencies for EIS/EIR



during regularly scheduled public meetings. In addition, the CALFED process has included members of the public in development of every Program component from ecosystem restoration to financing.

**CALFED BAY-DELTA PROGRAM
MISSION STATEMENT, OBJECTIVES
AND SOLUTION PRINCIPLES**

The mission of the CALFED Bay-Delta Program is to develop a long-term comprehensive plan that will restore ecological health and improve water management for beneficial uses of the Bay-Delta system.

CALFED developed the following objectives for a solution:

- Provide good water quality for all beneficial uses;
- Improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta to support sustainable populations of diverse and valuable plant and animal species
- Reduce the mismatch between Bay-Delta water supplies and current and projected beneficial uses dependent on the Bay-Delta system
- Reduce the risk to land use and associated economic activities, water supply, infrastructure and the ecosystem from catastrophic breaching of Delta levees.

In addition, any CALFED solution must satisfy the following **solution principles**:

- ***Reduce Conflicts in the System*** Solutions will reduce major conflicts among beneficial uses of water.
- ***Be Equitable*** Solutions will focus on solving problems in all problem areas. Improvements for some problems will not be made without corresponding improvements for other problems.
- ***Be Affordable*** Solutions will be implementable and maintainable within the foreseeable resources of the Program and stakeholders.
- ***Be Durable*** Solutions will have political and economic staying power and will sustain the resources they were designed to protect and enhance.
- ***Be Implementable*** Solutions will have broad public acceptance and legal feasibility, and will be timely and relatively simple to implement compared with other alternatives.
- ***Have No Significant Redirected Impacts*** Solutions will not solve problems in the Bay-Delta system by redirecting significant negative impacts, when viewed in their entirety, within the Bay-Delta or to other regions of California.

Phase I

The Program was divided into three discrete phases. In Phase I, completed in September 1996, CALFED identified the problems confronting the Bay-Delta, developed a mission statement and guiding principles, and devised three preliminary categories of solutions for Delta water conveyance.

Following scoping, public comment, and agency review, CALFED concluded that each Program alternative would include a significant set of Program elements addressing problems for levee system integrity, water quality improvements, ecosystem restoration, and water use efficiency measures. Two additional elements (water transfers and watershed management) were added to each alternative because of their value in helping the Program meet its multiple objectives. These six program elements have generally been referred to as the *common programs*. In addition, CALFED identified three preliminary alternatives to be further analyzed in Phase II. The three preliminary alternatives represented three differing approaches to conveying water through the Delta. The first conveyance configuration relied primarily on the existing conveyance system, with some minor changes in the south Delta. The second configuration relied on enlarging channels within the Delta. The third configuration included in-Delta channel modifications and a conveyance channel that would move some water around the Delta. Each of these alternatives also included consideration of new ground and surface water storage options.

Phase II

CALFED is currently in Phase II, which will end in late 1999 at the time of the Final Programmatic Environmental Impact Statement/Environmental Impact Report (EIS/EIR). A programmatic EIS/EIR, also referred to as a first-tier document, is typically prepared for a series of actions that can be characterized as one large project and is required for actions proposed by or approved by state and federal agencies. In Phase II, CALFED is developing a preferred program alternative, is conducting comprehensive programmatic environmental review, and is developing the implementation plan.

This Revised Phase II Report primarily focuses on the draft preferred program alternative including background, description, and implementation plan. The full EIS/EIR which will be released separately, other technical appendices, and supporting technical reports -- comprising thousands of pages -- are available from CALFED and major libraries throughout the state.

Phase III

In Phase III, following completion of the Final Programmatic EIS/EIR, implementation will begin. This period will include ~~additional~~ site-specific environmental review and permitting, as

necessary. Because of the size and complexity of any of the alternatives, implementation is likely to take place over a period of decades. Part of the challenge for Phase II is designing an implementation strategy that acknowledges this long implementation period and keeps all participants committed to the successful completion of all phases of implementation.

Public Involvement

During Phase I, which ended September 1996, CALFED held scoping meetings, technical workshops, public information meetings, and public BDAC workgroup meetings. The commitment to active public involvement has continued through Phase II with additional public meetings, presentations before focused groups, media outreach, special mailings of newsletters, regularly updated information on the Program's web site, and a toll-free public information telephone line.

In addition to the general public meetings and stakeholder workshops, 17 formal public hearings on the draft programmatic EIS/EIR were held around the state between April 21 and May 28, 1998.

The Program has worked to involve California's diverse multi-cultural communities by producing fact sheets in five languages (Spanish, Chinese, Japanese, Korean, and Vietnamese), meeting with multi-cultural business, media, social service and agricultural organizations, and placing media notices in ethnic media outlets. Increasing awareness and knowledge among the multi-cultural communities is a continued goal of CALFED's public outreach.

WHERE TO FIND PUBLIC OUTREACH INFORMATION

- Program's website (<http://calfed.ca.gov>)
- Toll-free public information telephone line (1-800-700-5752)
- *CALFED News, EcoUpdate* and Factsheets (available from CALFED Bay-Delta Program, 1416 Ninth Street, Suite 1155, Sacramento, CA 95814; phone 916-657-2666)
- BDAC and other public meetings

Next Steps in Phase II

Between the Revised Draft Programmatic EIS/EIR and the Final EIS/EIR in late 1999, work will continue on refining and evaluating the preferred program alternative. This will include additional technical evaluations. CALFED will work with elected officials, local agencies, interest groups, and the public over the coming months to finalize the preferred program alternative.

A new public comment period on the Revised Draft Programmatic EIS/EIR will begin in early 1999, including public hearings throughout the state. The Final Programmatic EIS/EIR is scheduled for late 1999.

Some Delta Statistics

Area of the Watershed: The system drains more than 61,000 square miles, or 37% of the state.

Area of the Delta: The legal Delta includes 738,000 acres.

Delta Inflow*: Historic inflow ranges from 6 to 69 million acre feet (MAF) per year; average is 24 MAF.

Diversions: Over 7,000 diverters draw water from the system, including 1,800 in the Delta itself.

Delta Exports*: The SWP and CVP draw an average of 5.9 MAF (approximately 3.6 MAF for agriculture and 2.3 MAF for urban uses) from the Delta each year .

In-Delta Water Use: Net in-Delta water use averages approximately 1 MAF annually.

Flora: Over 400 plant species can be found in the Delta, not including agricultural crops.

Fauna: The Delta harbors about 225 birds, 52 mammals, and 22 reptile and amphibian species.

Fish: There are 54 fish species in the Delta, and a total of 130 in the Delta and Bay.

Marshes: There are 8,000 acres of tidal marsh in the Delta; originally, there were 345,000 acres.

Levees and Channels: Over 700 miles of waterways are protected by 1100 miles of levees.

Subsidence: Some Delta lands are more than 20 feet below sea level.

Delta Farmland: Over 520,000 acres are farmed in the Delta.

Principal Crops: The most commonly grown Delta crops are wheat, alfalfa, corn, and tomatoes.

Agricultural Value: Average annual gross value of Delta production is \$500 million.

Recreation: Recreational use of the Delta is about 12 million user days per year

* Simulated flow based on historical hydrology, but with existing storage and conveyance facilities in place and operating to meet 1995 levels of demand.

2. BACKGROUND

2.1 Bay-Delta Problems/Objectives

There is a rich history of conflict over resource management in the Bay-Delta system. For decades the region has been the focus of competing interests--economic and ecological, urban and agricultural. These conflicting demands have resulted in several resource threats to the Bay-Delta: the decline of wildlife habitat; the threat of extinction of several native plant and animal species; the collapse of one of the richest commercial fisheries in the nation; the degradation of the Delta water quality; the continued land subsidence on Delta islands; and a Delta levee system faced with a high risk of failure.

At the simplest level, problems occur when there is conflict over the use of resources from the Bay-Delta system. As population increases, California asks more of the system, and there is more conflict. Single-purpose efforts to solve problems often fail to address the conflict. To the extent that these efforts acquire or protect resources for one interest, they may cause impacts on other resources and increase the level of conflict. Major conflicts are summarized below.

- *Fisheries and Water Diversions.* The conflict between fisheries and water diversions results primarily from fish mortality attributable to water diversions. This includes direct loss at pumps, reduced survival when young fish are drawn out of river channels into the Delta, reduced spawning success of adults when migratory cues are altered, and reduced survival associated with inadequate stream flows and reduced Delta outflows. The need to protect species of concern has prompted restrictions on pumping and other regulations ~~that allow sufficient fishery flows to remain in the natural system~~, which restricts the quantity and timing of diversions.
- *Habitat and Land Use.* Habitat to support various life stages of aquatic and terrestrial plants and animals in the Bay-Delta has been lost because of conversion of that habitat to agricultural and urban uses. In addition, some habitat has been lost or adversely altered due to construction of flood control facilities and levees needed to protect developed land. Efforts to restore the habitat can also create conflict with existing uses, such as agriculture and levee maintenance.
- *Water Supply Availability and Beneficial Uses.* As water use and competition for water have increased during the past several decades, so has conflict among users. A major part of this conflict is between the volume of instream water needs and out-of-stream water needs, and the timing of those needs within the hydrologic cycle.

- **Water Quality and Human Activities.** Water quality for ecosystem and consumptive uses can be adversely affected by a broad range of human activities. In addition to particular activities that discharge pollutants (such as abandoned mines or industrial sources), urban and agricultural areas produce degraded surface runoff that can seriously affect the Bay-Delta's many beneficial uses.

From these central conflicts, CALFED identified a series of problems in each of four problem areas. From each problem, a Program objective was developed. A complete set of identified problems and program objectives is contained in the *Program Goals and Objectives Appendix* to the Draft Programmatic EIS/EIR. The four problem areas for the Bay-Delta system are:

Ecosystem Quality - The Bay-Delta system no longer provides the broad diversity of habitats nor the habitat quality necessary to maintain ecological functions and support healthy populations and communities of plants and animals. ~~Declining fish populations and endangered species designations have generated major conflicts among instream and consumptive water users in the Bay-Delta system.~~ The health of the Bay-Delta ecosystem has declined in response to a loss of habitat to support various life stages of aquatic and terrestrial biota and a reduction in habitat quality due to several factors including diversion of water, toxics, and exotic species.

The primary ecosystem quality objective of the Program is to "improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta to support sustainable populations of diverse and valuable plant and animal species." The strategy to achieve this objective is to begin recovery of ecosystem health by reducing or eliminating factors that degrade habitat, impair ecological functions, or reduce the population size or health of species.

The ecosystem restoration program (ERP) is the largest, most comprehensive, and most inclusive environmental restoration program in the United States. It provides a new perspective to restoration science by focusing on the rehabilitation, protection, or restoration of ecological processes which create and maintain habitats needed by fish, wildlife, and plant species dependent on the Delta and its tributary streams. The program is supported by an implementation strategy that emphasizes solid science, adaptive management, and local participation: an innovative approach that is becoming a model for similar efforts throughout the nation.

Water Supply Reliability - During the past several decades, as water diversions and recognition of environmental water needs have both increased, conflicts between these water uses has also increased. Heightened competition and conflict during certain seasons or during water-short years has magnified the impact from natural fluctuations in water flow. In response to declining fish and wildlife populations, water flow and timing requirements have been established for certain fish and wildlife species. Over the past

decade, a number of actions including the Central Valley Project Improvement Act and the Delta Accord have reallocated over 1 million acre-feet (MAF) of ~~dry year~~-CVP/SWP water supply for environmental purposes during the driest years. These requirements have reduced the projects' flexibility to meet the demand quantity and timing of water exports from the Delta. There are concerns that additional restrictions that might be needed to protect species could increase the uncertainty of Delta water supplies. This basic disparity between water needs and water availability has created economic uncertainty in the water service areas and increased conflict over supplies.

The primary water supply objective of the Program is to "reduce the mismatch between Bay-Delta water supplies and current and projected beneficial uses dependent on the Bay-Delta system." The Program has a three-part strategy to reduce conflict and meet water supply reliability objectives. This strategy seeks to reduce the mismatch between supply and beneficial uses through a variety of actions including increasing the ability and flexibility to store and transport water, reducing the impact of water diversions on the Bay-Delta system, and managing demand by increasing conservation and water transfer markets.

Water Quality - The Delta is a source of drinking water for millions of Californians and is critical to the state's agricultural sector. In addition, good water quality is required to maintain the high quality habitat needed in the Bay-Delta system to support a diversity of fish and wildlife populations. Bay-Delta water quality is a primary concern.

The primary water quality objective of the Program is to "provide good water quality for all beneficial uses." Good water quality means different things to different users, and there are different ways to achieve the objective. For example, organic carbon that is naturally present in Delta water can contribute to carcinogenic treatment byproducts in drinking water, but this carbon supports the primary productivity and ecological function of the Bay-Delta system. The Program's strategy to achieve the water quality objective includes reducing or eliminating parameters that degrade water quality at its source. Many of the Program's water quality sub-objectives concentrate on this direct source control approach.

Levee System Integrity - Settlers first constructed levees in the Sacramento-San Joaquin Delta during the late 1800s. Initially settlers built levees to turn swamp and overflow lands into agricultural land and over time increased the levee heights to maintain protection as both natural settling of levees and shallow subsidence of Delta island soils occurred (biological oxidation, peat fires, and wind erosion have lowered interior island elevations over time). The increased levee heights combined with poor levee construction, and inadequate levee maintenance makes Delta levees vulnerable to failure, especially during earthquakes or floods. Delta island farmland, residences, wildlife habitat, and critical infrastructure can be flooded as a result of a levee failure. Levee

failure on specific Delta islands can have direct or indirect impacts on water supply distribution systems. Direct impacts result from flooding of distribution systems such as the Mokelumne Aqueduct, and indirect impacts result from salty water moving up into the Delta, as an island is inundated under non-flood conditions. The increased salinity in the Delta would be of particular concern in a low water year, when less freshwater would be available to flush out the salt water (such as occurred when the Brannan Andrus Island levee failed in 1972). Long-term flooding of specific Delta islands can have an effect on water quality by changing the rate and area of the mixing zone. A long interruption of water supply for in-Delta and export use by both urban and agricultural users could result, until the salt water could be flushed from the Delta.

The primary levee system vulnerability objective of the Program is to "reduce the risk to land use and associated economic activities, water supply, infrastructure, and the ecosystem from catastrophic breaching of Delta levees." Failure of Delta levees can result either from catastrophic events, such as earthquakes and floods, or from gradual deterioration. Subsidence of the Delta island peat soils and settling of levee foundations places additional pressure on levees and increases the risk of failure. The Program's strategy for achieving the levee system integrity objectives is to implement a comprehensive plan to address long-term levee stabilization and develop an effective emergency response capability in the event of failure while providing opportunities to maintain and enhance ecosystem values.

The unprecedented scope of the CALFED Bay-Delta Program cannot be overstated. The vast geographic extent of the area under consideration, the variety and complexity of the hydrological and ecological process involved, the history of conflict among the affected interests, and the magnitude of the potential economic consequences for California's commercial, agricultural, and industrial base all combine to make this effort the most ambitious of its kind anywhere in the world. In the United States, only the well-known efforts at addressing environmental and institutional problems in the Columbia River Basin, Chesapeake Bay, and in the Florida Everglades can serve as comparisons.

2.2 Fundamental Program Concepts

Three fundamental concepts related to the Bay-Delta system and its problems have guided the development of proposed CALFED solutions. These concepts are not new, but CALFED has looked at them in new ways to develop options for solving problems successfully.

First, the four problem areas (ecosystem quality, water quality, water supply reliability, and levee system integrity) are **interrelated**. CALFED cannot effectively describe problems in one problem area without discussing the other problem areas. It follows that solutions will be

interrelated as well; many past attempts to improve a single problem area have achieved limited success because solutions were too narrowly focused.

Second, there is great variation in the flow of water through the system and in the demand for that water at any time scale ~~we might examine~~ that might be examined (from year to year, between seasons, even on a daily basis within a single season). The value of water for all uses tends to vary according to its scarcity and timing. ~~CALFED can take advantage of this variability to reduce conflict and solve problems in several resource areas. This leads to the need for an overall water management strategy.~~

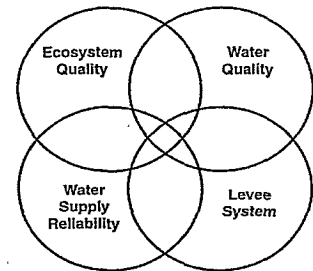
Finally, the solutions must be guided by **adaptive management**. The Bay-Delta ecosystem is exceedingly complex, and it is subject to constant change as a result of factors as diverse as global warming and the introduction of exotic species. CALFED will need to adapt management of the system as we learn from our actions and as conditions change.

Interrelationships

In the past, most efforts to improve water supply reliability or water quality, improve ecosystem health, or maintain and improve Delta levees were single-purpose projects. A single purpose can keep the scope of a project manageable but may ultimately make the project more difficult to implement. The difficulty occurs because a project with narrow scope may help to solve a single problem but have impacts on other resources, causing other problems. This in turn leads to conflict. Ultimately no problem is solved, or one problem is solved while others are created.

The CALFED Program takes a different approach, recognizing that many of the problems in the Bay-Delta system are interrelated. Problems in any one problem area cannot be solved effectively without addressing problems in all four areas at once. This greatly increases the scope of our efforts but will ultimately enable us to make progress and move forward to a lasting solution.

Significantly, there are many linkages among the objectives in the four problem areas and among the actions that might be taken to achieve these objectives. Solving problems in four areas at once does not require a four-fold increase in the cost or



Eight Program Elements Working Together to Solve the Four Problem Areas

- Long-Term Levee Protection Plan
- Water Quality Program
- Ecosystem Restoration Program
- Water Use Efficiency Program
- Water Transfer Program
- Watershed Program
- Storage
- Conveyance

number of actions. Most actions that are taken to meet program objectives, if carefully developed and implemented, will make simultaneous improvements in two, three, or even four problem areas.

What kinds of actions can be taken to solve problems in the Bay-Delta system? The actions can be grouped into categories of levee system improvements, water quality improvements, ecosystem restoration, water use efficiency, water transfers, watershed management, water storage, and Delta conveyance modifications. Specific actions range from physical restoration of habitat in the Delta to water conservation measures. Programmatic descriptions of the eight program elements are presented in Chapter 4 of this document. More detailed descriptions for the first stage implementation are presented in Chapter 5. Complete descriptions of Program elements are contained in various *Program Plans*.

While CALFED will generally not rely on new regulations to implement Program objectives, it does recognize that existing regulatory programs will continue to be implemented by CALFED agencies. CALFED represents a unique opportunity to provide high-level coordination of these regulatory programs so that regulatory implementation works in furtherance of CALFED Program goals. The CALFED Bay-Delta Program specifically defines incentives and voluntary partnerships to implement many individual actions in the Program. Incentives allow stakeholders to participate in CALFED actions which may not have been economical to them without the incentives. Partnerships allow stakeholders and CALFED agencies to leverage their individual resources by teaming on certain actions.

Some regulations, like those contained in ESA and Section 404 of the Clean Water Act, are ones that CALFED must satisfy as the Program is implemented. Many other regulatory actions can be made more effective and constructive as a result of CALFED actions. For example, water quality regulatory agencies are obligated to develop total maximum daily loads (TMDLs) for certain water quality constituents in the Bay-Delta system. CALFED efforts in monitoring and research will provide valuable information which will assist regulatory agencies in developing these TMDLs. CALFED incentive based source control actions will help reduce the load of these and other pollutants. In this way, many ongoing regulatory requirements will be easier to satisfy in the context of the CALFED Bay-Delta Program.

System Variability - Building a Water Management Strategy [Totally revised sec.]

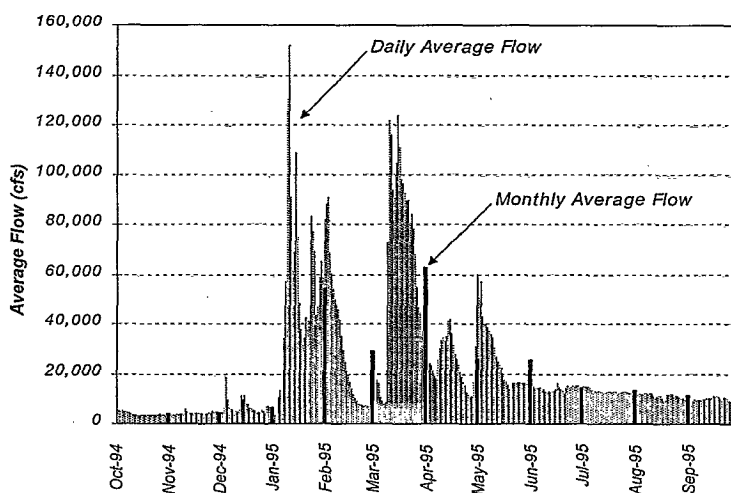
Variations in Supply and Demand

Any consideration of water management in California must start with a recognition of the immense variability in the availability of and demands for water. The watershed of the Bay-Delta system is subject to a highly variable rain and snowfall pattern. The total amount of precipitation and runoff in the watershed varies widely from month to month and from year to year. Year types are classified from wet to critically dry. Within any given year, whether wet or dry, most of the rain falls in the winter months, while snow pack typically melts in the late spring and early summer. In other months, water flow is typically much lower, leading to dramatically different flow levels for different months. Even within each month, flow can vary widely.

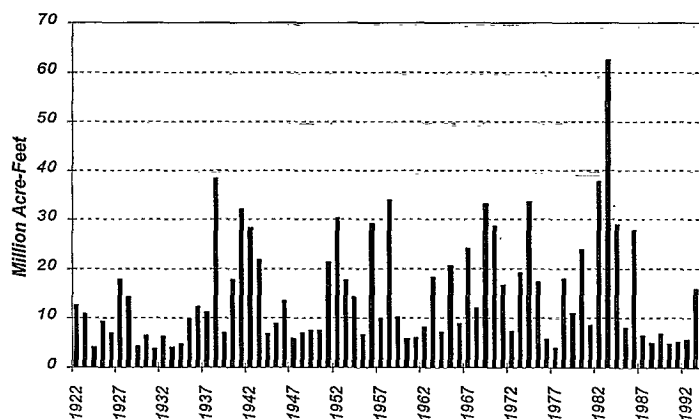
Two figures help illustrate the variability in the hydrologic system. Water flow variability is most notable when daily flows are examined. The first figure presents a graph of daily flows throughout a water year. For comparison, average monthly flows are also shown (thicker black bars). The average monthly flows mask the much greater variation exhibited in daily flows that rise and fall with the passing of each major storm system. It is quite typical for winter and spring storms to produce periodic peaks in flow such as those shown in January, March, and May.

The second figure shows a simulated yearly total Delta outflow for the period from 1922 to 1994. The simulated Delta outflow is based on historical hydrology, but with existing

**Sacramento River Flow at Hamilton City
Water Year 1995**



Yearly Total Delta Outflow



storage and conveyance facilities in place and operating to meet 1995 level of demand. The graph reflects the average annual variability that occurs from year to year. Memorable extremes, such as the drought of 1976-77, are quite apparent.

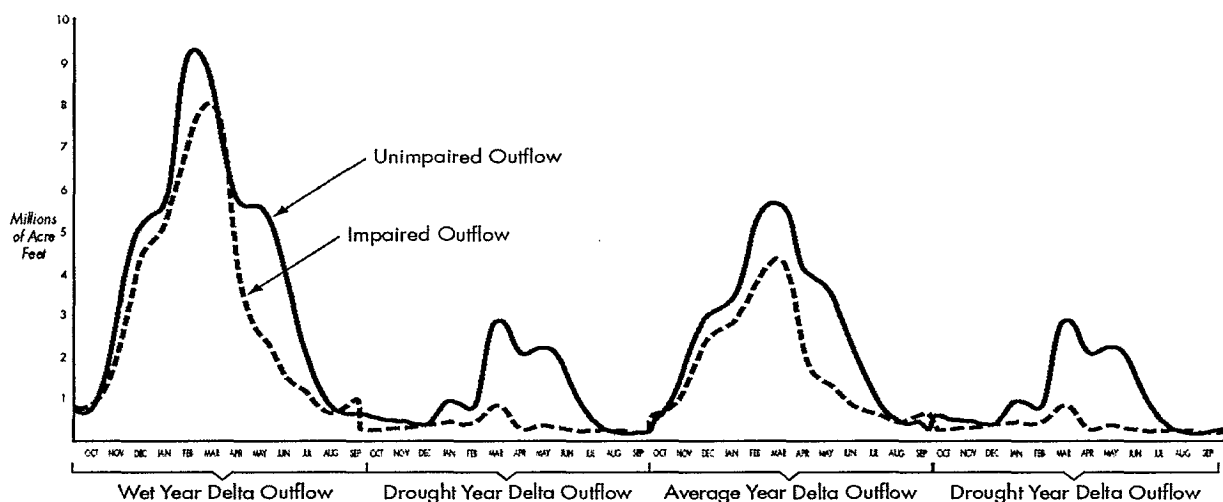
The demand for water also varies over time. Agricultural demands tend to be higher than average in dry years, because there is less natural soil moisture and plants need more irrigation. In addition, local supplies may be more limited in dry years, which imposes further demands on water imported from elsewhere in the system. Agricultural water demand also varies substantially seasonally; the demand is highest in the summer, when natural flows are lowest.

Urban demands for water vary as well. Many urban areas experience substantial seasonal variation in demands for landscaping irrigation. In addition, urban areas dependent on the Bay Delta for some or all of their drinking water supply place a significant premium on the quality of water (in addition to the quantity). In dry years and in dry seasons, increased salinity in the Bay Delta (from both saltwater intrusion and upstream discharges), reduces the usefulness of Bay Delta water to urban users.

The value of water in the ecosystem varies over time. For example, high flows in the early spring have substantial ecosystem benefits, including maintaining river and stream channels and triggering behavioral changes in some species, such as anadromous fish, that have evolved in this variable system. Ecosystem water needs are generally more consistent with the natural seasonal flow pattern than consumptive water demand, but historic changes in the system have resulted in circumstances where existing flows are low during times of high ecosystem need.

Variation in ecosystem demands for water is highlighted in the Figure, below, which illustrates the hypothetical impact of the water diversion system on natural flow patterns.

Change in Delta Outflow from System Development



This figure suggests that water diversions have had a relatively higher impact on the natural flow regime in drier water years than in wetter water years. As discussed below, many of the recent environmental protections imposed on the Bay Delta system have tried to reduce this relative stress on the environment during drier years. This discussion of the wide variability of both the supply of and demand for water suggests one important water management conclusion, which is that averages don't tell the whole story.

Averages are misleading because they mask the variability in flows and demands. An increase in Delta outflow in an average year may have only a minor beneficial effect on the environmental health of the system, whereas a similar increase in a dry or critically dry period may yield much greater environmental benefits. Similarly, although average increases in supplies may be desirable for urban and agricultural users, dry and critical year supplies are substantially more important given the higher demand and reduced alternatives. This variation in water supply and demand results in conflicts over water in the state, and conflict increases substantially in dry and critical years when all water uses, both environmental and consumptive, demand more water.

Institutional and Operational Framework

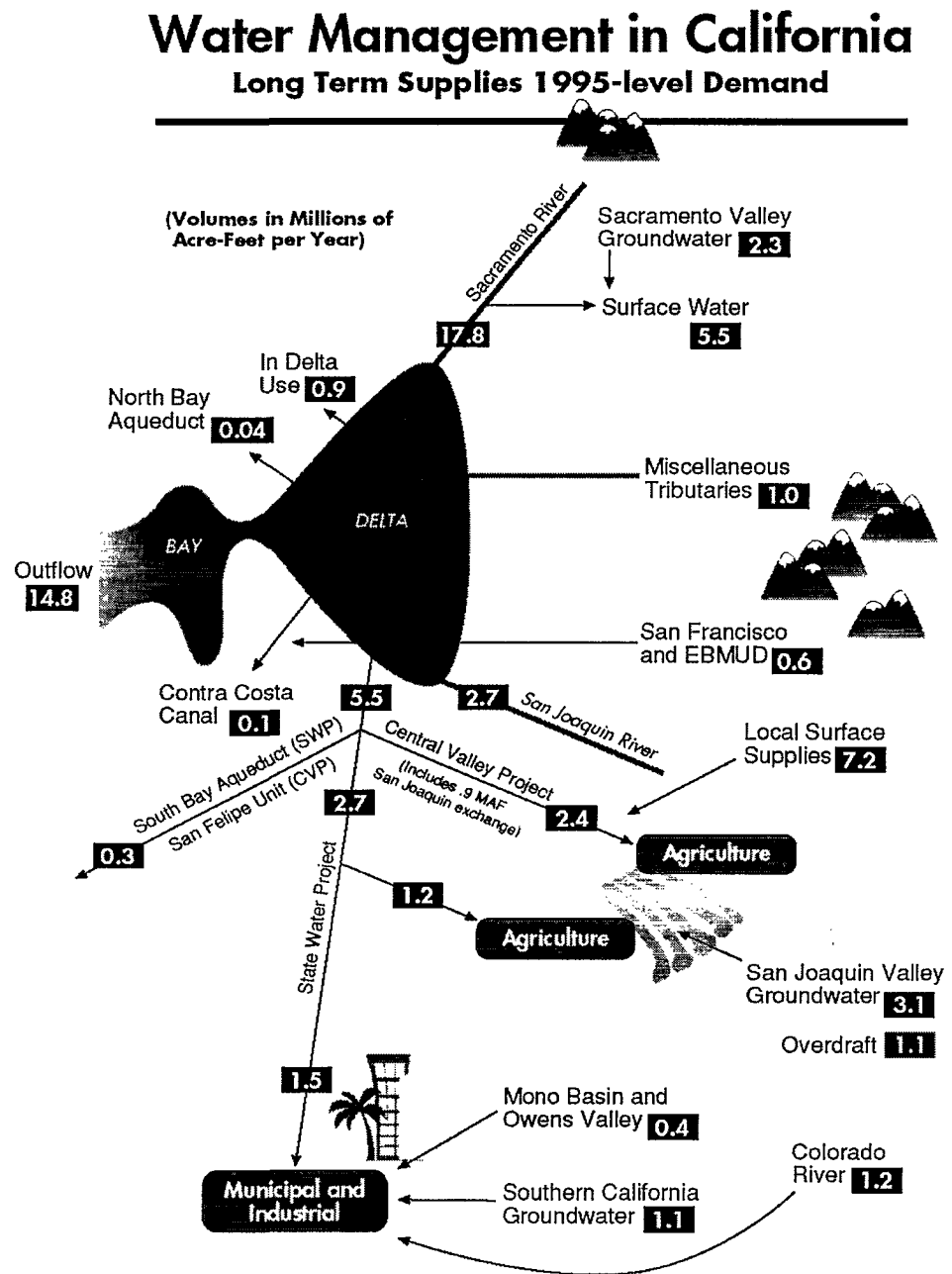
In response to the substantial variations in hydrology and in water demands, California has developed an extremely elaborate water diversion, storage, and delivery system. The broad purpose of these system has been to collect water in times of availability and to deliver it at the time and place of need.

In addition to the physical water system infrastructure, California has also created a legal/management structure governing its water resources. This legal/management structure relies on a complex set of rights, regulations, and contractual relationships that define which water users (both consumptive and environmental) will have access to water at particular times. For consumptive users, this system relies heavily on the concept of junior and senior priorities - those water users with more senior rights generally have more reliable water supplies than those with more junior rights.

In addition to allocating shortages, the legal/management system also allocates water savings. For example, if an upstream diverter introduces some water saving management techniques, the next downstream diverter with senior rights can have more access to water. Sometimes the allocation of savings is more complicated. In the State Water Project, water savings by one project user (Southern California urban users, for example) go back to the Project and are allocated by contractual rights to the next contractual project user (Kern County, for example).

The following two figures illustrate how the physical water delivery system interacts with the institutional management structure to determine water use in the Bay Delta system. These figures provide a simplified view of water use in (1) an average year, and (2) in a dry year.

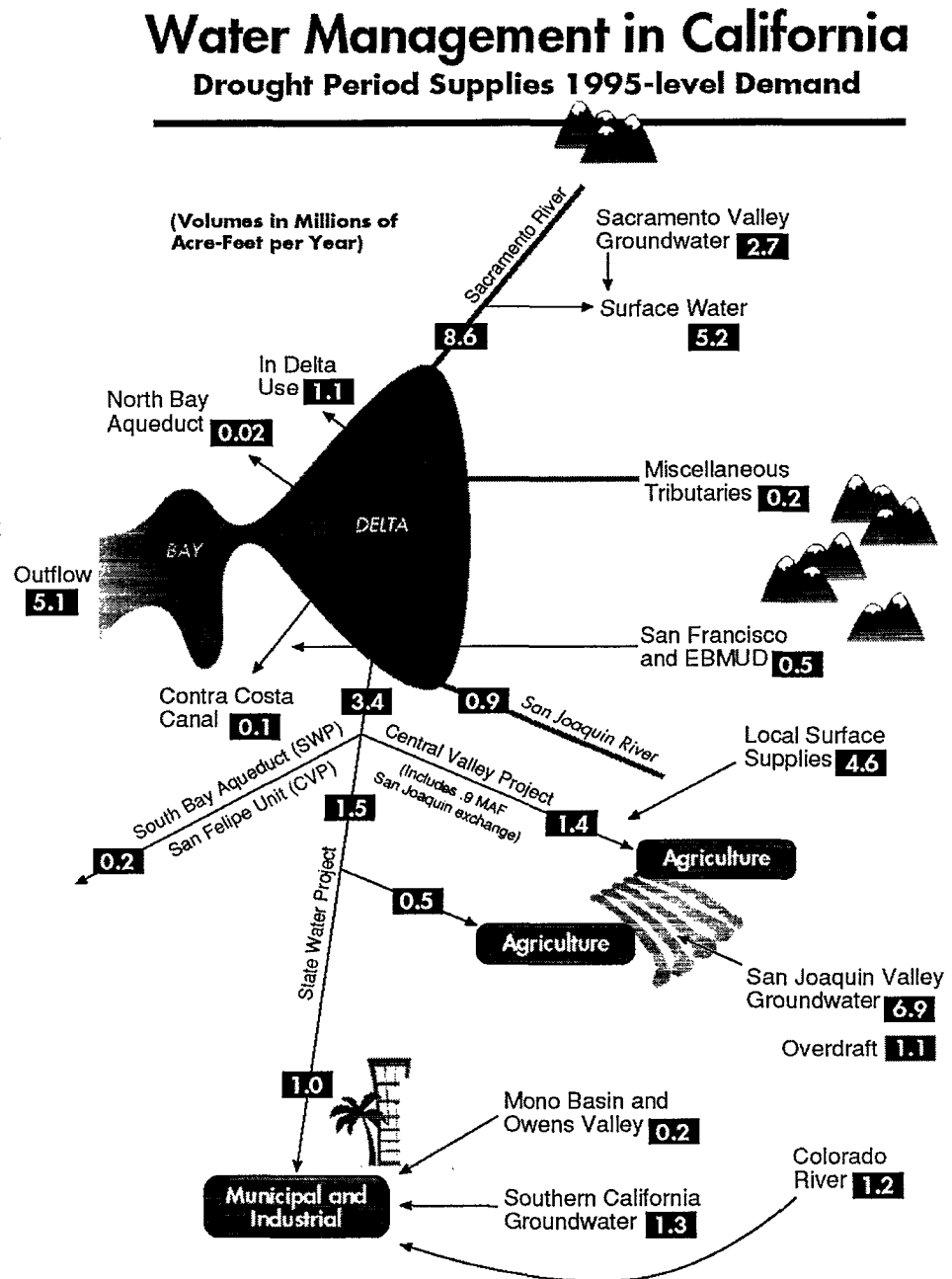
Two aspects of these graphs are worth highlighting. First, Delta water use throughout the system is substantially lower during the simulated dry year period. This is true for urban and agricultural users which shift to other sources to meet their demand. It is also true for the environmental uses (as represented by the decreased Delta outflow).



Second, the figures show clearly an ongoing problem with groundwater overdraft in the San Joaquin Valley. This is especially true in the dry year scenario, where groundwater pumping has been used to make up for significant shortfalls of imported water. The problem of groundwater overdraft is critical to long term water management in California. Overdraft can cause both land subsidence and the collapse of valuable underground storage capacity. In addition, concerns about groundwater depletion and degradation are frequently voiced in the debate over water transfers in the State.

The preceding discussion of the hydrological and institutional framework of

California water management is useful in understanding the current conflicts over water resources in the State. In recent years, the water management systems has experienced increasing stress as the regulatory process has started addressing the environmental degradation evident in the Bay Delta system. In effect, these regulatory measures have increased Delta outflow and reduced diversions, forcing consumptive water users to turn to other sources (groundwater pumping, water transfers, etc.) Given that the last several years have generally



been wet water years, the impacts of these environmental measures have generally been muted.

The following table is a modeled example of how the recent changes in the regulatory regime would reduce water deliveries by the state and federal water projects in the driest of water years and is generally an indicator of reduced operational flexibility.

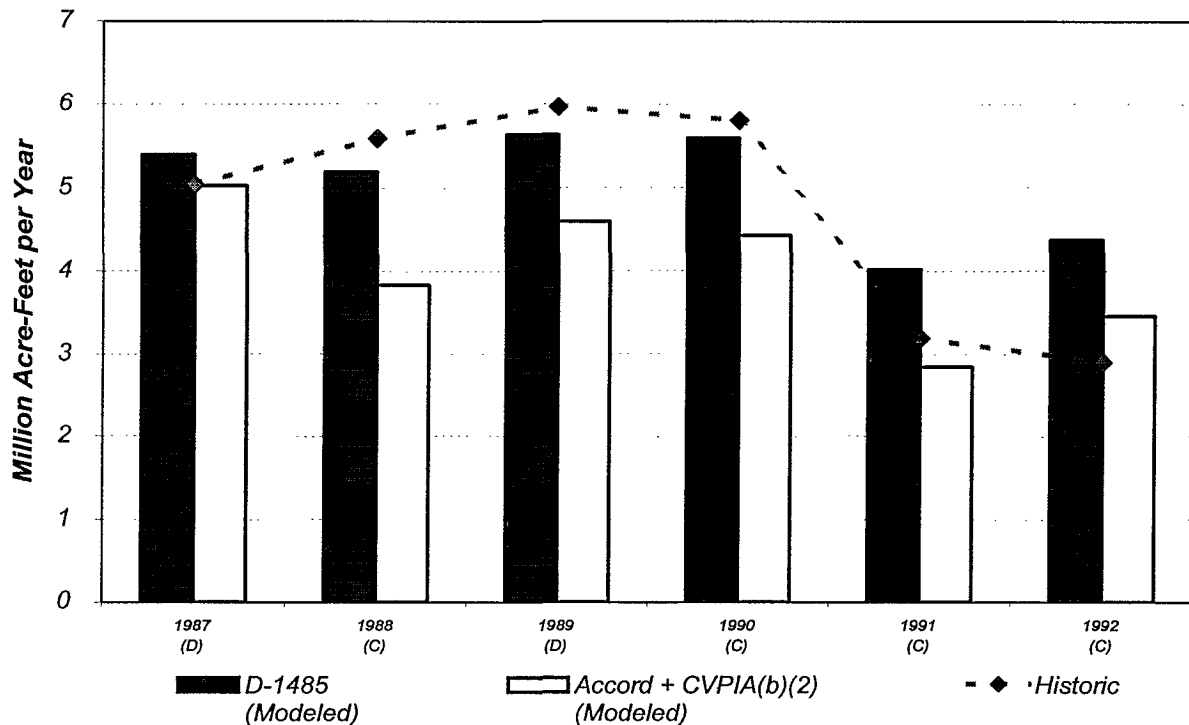
Modeled State and Federal Water Contract Deliveries
Impacts of Protective Operating Criteria
(in 1,000 Acre-Feet per Year)

Study	Condition	Long-Term Average Oct 1921 to Sep 1994			Dry Period Average Jun 1986 to Sep 1992		
		SWP	CVP	Total	SWP	CVP	Total
1.	Deliveries under D-1485	3,067	2,822	5,889	2,545	2,457	5,003
2.	<u>Incremental Water Supply Impacts Under:</u> 1994 Accord	-98	-231	-329	-357	-513	-870
3.	1994 Accord + CVPIA (b)(2)	-6	-171	-177	61	-283	-222
	Cumulative Water Supply Impacts:	-104	-402	-506	-295	-796	-1,092

This table highlights that conflicts over water in the state intensify in the driest water years, when all uses, both environmental and consumptive, are competing for a drastically reduced natural water supply. In addition, the regulatory regime itself has had another effect. By restricting the use of the water delivery system at certain times, the regulatory processes have reduced the overall flexibility of the water management system.

The following figure shows the results of the application of these measures during the 1987-92 drought. The environmental measures were not yet in force during that period. The figure shows that their application would have resulted in decreased deliveries and loss of flexibility. This is a current matter of concern, one that is not dependent on projected water demand.

**Delta Exports Under Various Protective Operating Criteria
June 1986- September 1992 Dry Period**



Defining water supply reliability

CALFED has identified water supply reliability as one of the major problem areas it will address. Unfortunately, this term means different things to different people. Some interpret the term as meaning average water deliveries or average deliveries during dry periods. As shown above, average deliveries don't adequately account for the extreme variation in California hydrology. Further, a focus on dry period deliveries is generally just another way of restating the fact that conflicts over water are most intense during dry periods. Some stakeholders have suggested that the proper measure of water supply reliability is the ability of the system to provide for both a sustainable urban and agricultural economy and a healthy ecosystem.

CALFED believes that an appropriate working definition of success in water supply reliability is the following list of objectives:

- Reduce water diversion conflicts between instream beneficial uses (environmental uses) and out-of-stream beneficial uses (consumptive uses).
- Decrease drought impacts, both for the environment and for other water users.
- Increase water supply availability by providing means for water users and the environment to acquire additional water at high priority times and places.
- Increase operational flexibility by improving the ability of the system to respond appropriately to unforeseen or unpredictable future events.
- Increase the utility of the water used for all beneficial uses by improving water quality.

CALFED's water supply reliability goal is to develop and implement a water management strategy that achieves each of these five qualitative objectives.

Water management tools

There are seven general categories of tools that can be used to manage water in the California system. Each of these tools is already being implemented in California to some degree. The tools are:

- Water conservation
- Water recycling
- Water transfers, both short term and long term
- Storage, both groundwater and surface water
- Watershed management
- Water quality control
- Monitoring and real-time diversion management

In evaluating these tools, there are three fundamental factors to consider: (a) costs, (b) flexibility, and (c) environmental impacts.

Costs - The different tools differ substantially as to cost. One important measure of cost is the estimated cost per acre-foot of water supply. Some estimates of this cost measure have been generated by CALFED and are shown in the following table. This table illustrates the wide differences in the costs of tools, both between types of tools (recycling versus transfers) and within a particular tool (conservation, for example).

Potential Water Supply Reliability Measures (with 1995-Level Population and Water Deliveries)		
Reliability Measures	Potential Water Supply (MAF per Year)	Estimated Cost Range (\$/acre-foot)
Urban Conservation (Irrecoverable Loss Portion)	1.1 - 1.5	\$50 - \$1,600
Agricultural Conservation (Irrecoverable Loss Portion)	0.25 - 0.50	\$50 - \$850
Urban Recycling	0.5 - 1.0	\$800 - \$1,500
Storage (Stage 1) ¹	0 - 0.32	\$250 - \$500
Water Transfers ²	0.6 - 1.2	\$50 - \$250
Notes: ¹ Dry period water supply with 1.3 MAF of storage (small Shasta enlargement, Madera Ranch, enlarged Kern Water Bank, and In-Delta storage) plus increasing SWP export capacity and joint use of facilities. ² From <i>Least-Cost CVP Yield Increase Plan</i>		

Although cost per acre-foot is an important cost measure, other cost factors must also be assessed. For example, the cost of water will further increase depending on improvements required to meet water quality objectives (salinity, mercury, etc.). Depending on the water source, the costs for source control measures and treatment measures will vary. These cost differences are important in deciding the proper mix between watershed actions and treatment actions to attain the water quality goals.

Flexibility - Water management tools also differ as to their flexibility. For example, many water conservation measures have substantial benefits in reducing overall demand, but, once implemented, don't provide flexibility to react to changes in hydrological circumstances. Similarly, surface storage facilities are very effective at providing a rapid reaction in either releasing or collecting large amounts of flow. Although groundwater storage may hold more volume, it would have to be operated in conjunction with surface storage to attain the same level of flexibility.

Environmental Impacts - Finally, water management tools differ as to their potential negative effects on environmental resources. Generally, water conservation measures are viewed as more environmentally benign, given that they may reduce the overall demand for water diverted out of the environment. Nevertheless, even here, there may be adverse environmental effects. For example, substantially increasing farm or landscape irrigation efficiency may reduce water runoff that currently sustains aquatic or aquatic-dependent ecosystems.

Water storage facilities also differ in their potential negative effects on environmental resources. Many believe that groundwater storage facilities impose fewer negative impacts than surface storage, and that off-stream storage imposes fewer impacts than on-stream storage. Further, additional storage of any kind, by its very nature, raises the possibility of increased net overall diversions from the system, and it remains a subject of scientific debate whether, how, and to what extent, additional diversions can be made out of the Bay Delta system without imposing additional stress on environmental resources.

In evaluating any particular set of water management tools, CALFED will consider the relative value of the tools as to these three fundamental factors of cost, flexibility, and environmental impacts.

CALFED's Water Management Strategy

In light of the substantial variability of demand and supply, as well as the different utility of the various water management tools, CALFED believes that the appropriate water management strategy will not be a single approach, but the proper combination of all of the available tools. This concept is best portrayed as a matrix of measures, shown in the following figure.

Integrated Water Management Strategy											
Water Management Objectives	Water Management Tools										
	Transfers		Conservation			Recycling	Storage		Watershed Management	Water Quality Control	Monitoring and Real-Time Diversion Management
	Long-Term	Drought Water Bank	Agricultural	Urban	Wetlands		Groundwater	Surface			
Reduce Diversion Conflicts											
Decrease Drought Impacts											
- Environmental Flows											
- Ag/Urban supply											
Increase Supply Availability											
- Drought											
- Average											
Increase Operational Flexibility											
Increase Supply Utility (WQ)											

As it moves to fill in the values of this Water Management Matrix, CALFED is relying on a number of important principles, including:

- The recognition that water is a scarce resource in California, and that it must be used wisely for all beneficial purposes
- A desire to rely on market mechanisms and market approaches wherever possible
- The recognition of the variability in the value of water for all uses (both environmental and consumptive)
- As discussed in more detail below, the need to adaptively respond to new information or new conditions in the system

The details of CALFED's water management strategy are described as part of the Draft Preferred

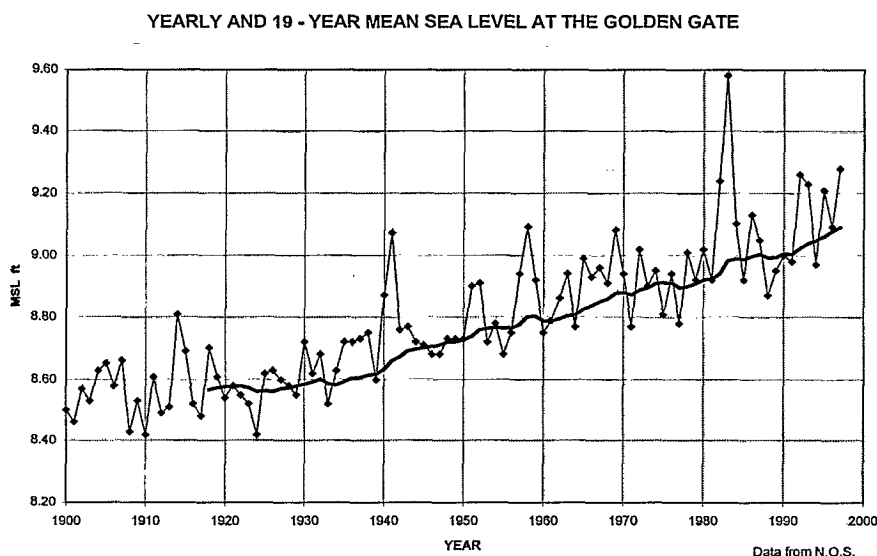
Alternative in Chapter 4. The first steps CALFED proposes are detailed in the list of Stage 1 actions in Chapter 5. As to particular water management tools, Stage 1 will do the following:

- A high level of water use efficiency (both conservation and recycling) must be achieved.
- Substantial progress in refining the water transfers institutional framework must be demonstrated.
- Storage, both groundwater and surface storage, must be thoroughly investigated and implemented, where appropriate.
- Watershed management studies and projects must be implemented to improve the timing, volume and quality of water resources.
- Water quality source control and other management measures must be implemented to address salinity in the system.
- Monitoring and diversion management improvements must be evaluated and implemented on an ongoing basis.

Adaptive Management

A third fundamental concept of the Program is adaptive management.

No long-term plan for management of a system as complex as the Bay-Delta can predict exactly how the system will respond to Program efforts or foresee events such as earthquakes, climate change, or the introduction of new species to the system. For example, how will the CALFED levee program be adapted in the future if sea levels continue to rise?



The fundamental concept of adaptive management is that management prescriptions will be assessed and refined (adapted) according to new information in order to meet program goals and objectives. Adaptive management is an iterative process that involves: 1) identifying clear goals and objectives for the program elements; 2) using models to identify our understanding of the Bay-Delta system and to assess and prioritize a range of potential actions to improve the system; 3) implementation of actions and research most likely to achieve goals and objectives and to improve our knowledge of the system; and 4) monitoring and assessment of actions to gain information to refine the models and alter future actions in order to meet program goals and objectives; and 5) changing management activities based upon new information.

Adaptive management, as an essential Program concept, acknowledges the need to constantly monitor the system and adapt the actions to restore ecological health and improve water management. These adaptations will be necessary as conditions change and as CALFED learns more about the system and how it responds. The Program's objectives will remain fixed over time, but actions can and should be adjusted to assure that the solution is durable.

The concept of adaptive management is an essential part of every CALFED Program element, as well. In every part of the Program, new or more intensive actions are proposed. Along with these proposed actions comes uncertainty. What actions work best to achieve program objectives? How can these actions be modified to work better, cost less, or be simpler to implement? How should the emphasis among actions change over time? Are there new or

different actions that should complement or replace those that are being implemented? An adaptive management approach helps to answer these questions and act on those answers.

More detailed concepts of an adaptive management approach are included in the implementation plan in Chapter 5.

3. Preferred Program Alternative Development

At the beginning of Phase II of the CALFED Bay-Delta Program, seventeen alternative variations were developed around the three broad alternatives (existing system conveyance, modified through Delta conveyance, and dual Delta conveyance) resulting from the Phase I work. Five alternative variations were eliminated due to technical problems or to reduce duplication where two or more alternatives achieved the same Delta conveyance function. The remaining twelve alternative variations were described in the *Project Alternatives Technical Appendix* to the Draft Programmatic EIS/EIR in March 1998.

The March Draft Programmatic EIS/EIR did not specify a preferred program alternative but presented impact analyses of the twelve alternative variations. The twelve alternative variations represented a reasonable range of different configurations of Delta conveyance and storage assembled with the other program elements for levee system integrity, water quality, ecosystem quality, water use efficiency, water transfers, and watershed management. CALFED believed that the features and impacts of the preferred program alternative, when developed, largely would be covered by the range of analyses in the *Draft Programmatic EIS/EIR*. CALFED realized that some additional analyses may be required where the preferred program alternative fell outside this range.

To help the comparison of alternatives, the twelve alternative variations were grouped into the three broad categories:

Alternative 1 - Includes program elements for ecosystem restoration, water quality, levee and channel integrity, water use efficiency, water transfers, and watershed management. In addition, Alternative 1 proposes the use of existing Delta channels, with some modifications, and various storage options.

Alternative 2 - Includes program elements for ecosystem restoration, water quality, levee and channel integrity, water use efficiency, water transfers, and watershed management. In addition, Alternative 2 proposes significant modifications of interior Delta channels to increase water conveyance across the Delta, combined with various storage options.

Alternative 3 - Includes program elements for ecosystem restoration, water quality, levee and channel integrity, water use efficiency, water transfers, and watershed management. In addition, Alternative 3 includes Delta channel modifications coupled with a conveyance channel that takes water around the Delta, combined with various storage options.

Based on assumptions made for evaluations in the March *Phase II Interim Report*, the dual Delta conveyance with an isolated facility appeared to provide greater technical performance than the

other alternatives. At the same time, however, the dual Delta conveyance appeared to present the most serious challenges in terms of ~~“assurances”~~ “assuring” that this solution could be implemented to achieve the intended results. Since March 1998, development of the draft preferred program alternative has focused on assurances and on refining the technical analyses. The need for better assurances and scientific information led CALFED to more fully integrate adaptive management throughout the program elements. This led to a draft preferred program alternative that will be implemented in stages over time. Each stage begins implementation of certain actions, gathers scientific information to help future decisions on other actions, and provides greater assurances that actions within each stage will move forward together and will be operated as intended. The draft preferred program alternative is discussed in more detail in Chapter 4.

Since March 1998, CALFED used a number of additional analyses to help sort through the performance of the alternatives, answer additional questions, and develop a draft preferred program alternative that best meets the CALFED Bay-Delta Program purpose. These are summarized in the following sections.

3.1 Distinguishing Characteristics

Looking simultaneously at all the information on how well the alternatives meet the objectives and how well they satisfy the solution principles would be nearly impossible due to the large amount of information. Furthermore, many aspects of the alternatives do not vary from one alternative to another. They all include program elements that make significant progress toward meeting program objectives and reducing conflict in the system.

On the other hand, there are aspects that do differ among the alternatives and it is these aspects, or distinguishing characteristics, that guided the evaluation. These characteristics are important when assessing the performance, impacts and overall merits of each alternative. Following are the eighteen identified distinguishing characteristics:

- **In-Delta Water Quality** - provides a measure of **salinity** and **flow circulation** for four areas of the Delta. The measure focuses on water quality for in-Delta agricultural uses.
- **Export Water Quality** - provides a measure of **salinity**, **bromide**, and **total organic carbon** for four export diversion locations from the Delta. The measure focuses on municipal/industrial uses for the North Bay Aqueduct and Contra Costa Intake and for agricultural and municipal/industrial uses for the SWP and CVP export pumps in the south Delta.

- **Diversion Effects on Fisheries** - intended to include only the **direct effects on fisheries due to the export diversion intake and associated fish facilities**. These will vary depending on diversion location, size, type, method of handling bypassed fish, and annual volume of water diverted. The effects on flow patterns in the Delta as a result of the diversion are addressed in the distinguishing characteristic for "Delta Flow Circulation". The loss of fish due to diversion to another route is covered in this effect.
- **Delta Flow Circulation** - is intended to include the **direct and indirect effects of water flow circulation on fisheries due to the export diversions and changes in cross-Delta water conveyance facilities**. These will vary depending on diversion location, size, type, and operation of conveyance facilities, and annual volume of water diverted.
- **Storage and Release of Water** - provides a measure of the environmental benefit or adverse effects of storing water in a new Program storage facilities and releasing that water at a later time of need. Storing the water will generally result in some degradation of environmental conditions while releasing that water, for whatever use, will generally result in some environmental benefits.
- **Water Supply Opportunities** - is a measure of the change provided by the alternatives for water supply for the environment and for agricultural and urban uses.
- **Water Transfer Opportunities** - is an estimate of how well each alternative can carry water that may be generated through market sales or trades at different locations in the system. This estimate assumes that a certain amount of conveyance capacity has already been allocated for state and federal project water.
- **Operational Flexibility** - provides an indication of how well each alternative can shift operations as needed from time to time to provide the greatest benefits to the ecosystem, water quality, and water supply reliability.
- **South Delta Access to Water** - is a measure of how the alternatives affect local beneficial use of water in the vicinity of the state and federal Delta export facilities due to changes in water levels and water quality in the channels.
- **Risk to Export Water Supplies** - is intended to provide a measure of which alternatives best reduce the risk to local and export water supplies from a catastrophic earthquake.
- **Total Cost** - will include the initial capital costs for the Program as well as annual

costs. Initial costs will include study, design, permitting, construction, mitigation, acquisition, and other first costs of the Program. Annual costs will include operation and maintenance, monitoring, reoccurring annual purchases, and other annual costs.

- **Assurances Difficulty** - is an estimate on how difficult it will be to formulate an assurance package and get consensus among agencies and stakeholders. It is not an assessment on the perceived effectiveness of the assurance package.
- **Habitat Impacts** - is an assessment of the adverse habitat impacts due to implementation of the storage and conveyance facilities.
- **Land Use Changes** - is primarily a measure of the amount of agricultural land that would change to other uses by implementation of the Program.
- **Socio-Economic Impacts** - include adverse and beneficial impacts on commercial and recreational fishing, farm workers, power production, and others indirectly affected by Program actions.
- **Consistency with Solution Principles** - provides a qualitative measure of how well the alternatives meet the Program solution principles. Alternatives which violate the solution principles are not likely to be practicable or implementable. The solution principles provide insight in considering tradeoffs among the other distinguishing characteristics in a balanced manner.
- **Ability to Phase (Stage) Facilities** - provides an indication on how easy it will be to stage implementation of storage and conveyance facilities over time.
- **Brackish Water Habitat** - In the Bay-Delta system there is a salinity gradient between fresh and salt water. The western Delta is an area of important aquatic habitat with salinity levels of approximately 2 parts per thousand. The location of this salt concentration, known as X2, is an indicator of effects on this critical brackish water habitat among the alternatives.

The March 1998 *Phase II Interim Report* provided a summary of preliminary analyses with these eighteen distinguishing characteristics. In these analyses, two key distinguishing characteristics seemed to be particularly important in identifying how well the alternatives perform.

Export Water Quality and Diversion Effects on Fisheries, are highly dependent on the alternative selected. Therefore, irrespective of whether these two characteristics are the most important to selection of the preferred program alternative, they are the characteristics most dependent on that decision.

As mentioned previously, based on assumptions made for evaluations in the March 1998 *Phase II Interim Report*, the dual Delta conveyance with an isolated facility appeared to provide greater technical performance than the other alternatives. Since March, CALFED staff have refined analyses of these eighteen distinguishing characteristics using updated modeling and data. These refined analyses support the earlier conclusion that the dual Delta conveyance with an isolated facility appears to provide greater technical performance than the other alternatives (see Attachment A for a summary of the analyses). At the same time, however, there are still major assurances issues associated with this approach, and CALFED needs to obtain better scientific information plus information on an array of other water management options before a decision can be made on this alternative to assess the need for, and timing of, the dual Delta conveyance. In addition, while the dual Delta conveyance may have technical advantages over other Delta conveyance, it would likely take a decade or more to plan, design, permit, and construct.

To address the assurances, need for better scientific information, and long lead time required for the dual Delta conveyance, CALFED more fully integrated adaptive management throughout the program elements. This led to structuring implementation in stages over time. Each stage begins implementation of certain actions, gathers scientific information to help future decisions on other actions, and provides greater assurances that actions within each stage will move forward together and will be operated as intended. With this approach, a more informed decision on the timing and need for the dual Delta conveyance can be made in the future.

For all of the reasons noted above, the basic strategy of the CALFED Program is to initially develop a through Delta conveyance alternative based on the existing Delta configuration with some channel modifications. In the event that this basic strategy, when carried out in conjunction with all of the common programs and consideration of other water management options, is unable to meet CALFED program goals for drinking water quality or fishery recovery, CALFED would be warranted in moving forward with the modifications that include construction of an isolated conveyance facility to carry a portion of export water around the Delta to the south Delta export pumps. During Stage 1, CALFED will evaluate any additional information developed in the ongoing monitoring and scientific analysis program, and will consider whether the basic strategy should be modified to include an isolated facility or other improvements should be constructed to meet for meeting CALFED Program goals and objectives. (See more detailed discussion in Conveyance, page ____).

Additional technical work is proceeding on drinking water quality and diversion effects on fisheries as summarized in the following two sections. Also, Attachment B contains a summary of sensitivity analyses to show how differing assumptions in several areas may or may not alter CALFED's choice of the preferred program alternative.

3.2 Bromide Panel

CALFED analyses indicate the selection of a preferred program alternative can have profound effects on concentrations of bromide in drinking water supplies taken from the Delta. This is true because the Pacific Ocean is a major source of bromide in the system. Bromide is a concern to drinking water purveyors because it is capable of undergoing chemical reactions that produce unwanted and potentially harmful chemical byproducts during disinfection of drinking water. Because the choice of storage and conveyance alternatives is predicted to have more potential for affecting will affect bromide concentrations more than any other actions that have been studied, effects of the alternatives on bromide concentrations was identified as a key feature that will distinguish the selection of a preferred program alternative.

To better understand the significance of bromide in Delta drinking water supplies, CALFED assembled a panel of independent, nationally recognized scientific experts to deliberate and provide relevant recommendations. The panelists were chosen with the collaboration of the members of the water quality technical group, the body of agency staff and stakeholders who provide technical advice and recommendations to the CALFED water quality program. The primary areas of expertise of the panelists included chemistry of disinfection byproduct formation, source control, health effects of disinfection byproducts, water treatment, and drinking water regulation development. The panel met on September 8 and 9, 1998.

[At the time of this writing, the panel report has not been received and, therefore, no official conclusions can be stated; however, the following points are based on staff observations of the bromide discussion.]

- Delta waters contain considerably higher bromide concentrations than are typically found in drinking water supplies elsewhere in the nation.
- It is important to address concentrations of organic carbon as well as bromide in Delta waters because both react to produce unwanted chemical byproducts. It is also important to address fecal contamination in source waters since lower levels of pathogen concentrations will allow for less disinfection to provide a microbiologically safe water and thereby easier compliance with future DBP regulations.

- Some water treatment technologies appear promising, and considerable research into such technologies is underway. For example, membrane technology can remove both organic carbon and bromide to a significant degree, in addition to removing infective microorganisms. On the other hand, such technologies currently are expensive, though research may improve the economic outlook.

The next stage of drinking water regulations for disinfection byproducts is scheduled for the year 2002, which will occur well before a CALFED alternative could be fully implemented. Accordingly, it is desirable to develop a short-term strategy to enable these drinking water regulations to be met by agencies using Delta water:

Recent research has identified hundreds of chemicals that could result from drinking water treatment, and whose potential to harm the health of humans is unknown. Of these, a significant number contain bromine. For this reason, it can reasonably be expected that the bromide issue will remain of concern with regard to safe drinking water, and that the regulatory stage scheduled for 2002 will probably not be the last that will be required to protect consumer's health.

CALFED should be an active participant in the information collection process leading to drinking water regulations for disinfection byproducts:

Sources of bromide other than the ocean should be further investigated with respect to the potential for source control measures:

Additional modeling studies need to be performed to predict concentrations of individual disinfection byproduct chemicals that would result from the alternatives, because health effects of these chemicals appear to differ significantly:

CALFED should evaluate new treatment processes for preventing or removing bromine-containing disinfection byproducts in drinking water:

CALFED should work with urban agencies using Delta waters to develop common means of measuring and evaluating phenomena related to disinfection byproduct formation. This effort would result in broader capability to learn from, and profit by, the experience of individual agencies:

CALFED should support efforts to refine the capability to perform and appropriately apply human health risk assessments:

CALFED should monitor water quality parameters having potential for health concern in the foreseeable future:

The following is a summary of the findings contained in the panel report, published in November 1998:

The major source of bromide within the Delta is seawater derived from tidal exchange with San Francisco Bay.

There are major concerns about public health effects of the disinfection byproducts of drinking water treatment, including cancer, mutation, and reproductive effects. Those containing bromine may be of particular concern.

The U.S. Environmental Protection Agency intends to promulgate more stringent standards for disinfection byproducts in drinking water which can produce a conflict between the need for adequate microbial disinfection and the need to avoid production of harmful chemical byproducts.

Because both bromide and organic carbon are involved in disinfection byproduct formation, their co-occurrence in the Delta is important. Similarly, the co-occurrence of pathogenic organisms resulting from pollution in the Delta is important as their presence can complicate control options because of potentially higher disinfection levels needed to destroy or inactivate pathogens.

Options for removing bromide through treatment are very limited, though organic carbon, that also reacts to form disinfection byproducts, can be effectively reduced by treatment. Unfortunately, removal of organic carbon can enhance formation of bromine-containing disinfection byproducts.

Options exist for minimizing formation of bromine-containing disinfection byproducts, and for removing such byproducts once formed, but there are water quality and technological constraints on the ability to do this.

Management of bromide can best be realized through a combination of treatment and source control. The three CALFED alternatives reflect different options for managing the mixing of seawater fresh water as it is conveyed through the Delta.

There must be a short-term (before implementation of an alternative) and a long-term (after alternative implementation) strategy for drinking water utilities using Delta water. Emphasis in the short term should be on treatment and on possibilities for source control of bromide, organic carbon and pathogens. In the long term, more substantial source management options are possible with implementation of an alternative for conveying water through the Delta.

3.3 Diversion Effects on Fisheries

Direct and indirect effects of the existing state and federal water projects are thought to be important, perhaps critical, factors in the decline and endangerment of some fish species.

Aspects of the current problem include:

- Predation in Clifton Court Forebay; entrainment of fish, eggs, and larvae at the SWP and CVP export pumps (partly due to inadequate fish screen facilities)
- Mortality associated with the need to capture, sort and transport fish to Delta channels away from the screens
- Adverse flow patterns induced by the transport of Sacramento River water across the Delta for diversion, which affects the migration and spawning of fish species.
- Reductions in habitat quality and availability induced by changes in flow conditions in the system caused by project operations and the north-to-south transport of water across the Delta to the export facilities

There is a fair degree of agreement on the relative magnitude of fish losses due to diversion effects that would occur under the various alternatives. However, there is much less agreement on the role of diversion mortality in controlling population abundance when compared to other stressors such as habitat loss.

The focus for diversion effects on fisheries is on particular estuarine and migratory fish: chinook salmon, delta smelt, splittail, striped bass, steelhead and white catfish. Observations over the last half century indicate that these species are quite vulnerable to having their behavior disrupted by the transport of water from the Sacramento River to the export pumps in the south Delta. ~~For other fish species, diversion effects do not appear to be a major stressor. Other Delta resident fish such as tule perch and several members of the sunfish family appear relatively invulnerable to being drawn to the export pumps were not specifically evaluated but would benefit from improvements made for the above estuarine and migratory fish.~~ Fish such as starry flounder and longfin smelt, and other organisms such as bay shrimp, live primarily downstream of the Delta. Although they are potentially affected by changes in the amount of water flowing from the Delta through San Francisco Bay to the ocean, they appear to have little vulnerability to diversion effects of the export pumps.

CALFED has formed interagency/stakeholder groups to address the technical issues related to diversion effects on fisheries. The Diversion Effects on Fish Team (DEFT) was formed in February 1998 to evaluate the technical issues related to diversion impacts on fisheries. In its review, the DEFT considered both the direct effects of entrainment and the related effects of Delta flow circulation. CALFED first asked the DEFT to evaluate the likelihood of fisheries recovery under the three existing alternatives. The DEFT reported that, while the dual conveyance alternative would result in the greatest benefit to fisheries, they were not confident that any of the alternatives as described would necessarily recover all affected fish species. CALFED then asked DEFT to develop modified alternatives that would recover these species. Given the concerns about the implementability of the dual Delta conveyance, the DEFT was instructed to begin this effort by developing a modified through-Delta conveyance alternative that, if implemented, would result in the recovery of these fish species. DEFT's activities since

then have focused on a modified through-Delta alternative.

The NoName Group (NoName) was established in 1994 as part of the Operations Group effort at real-time project management. In June of 1998, NoName was asked by CALFED to recommend water supply and water quality measures that are capable of being implemented within Stage 1 (first 7 years) of the Program.

Because of the long lead time required to plan, design, permit, and construct any major water facility, the existing Delta channels must be used for many years even if CALFED needs to move to construct a dual Delta conveyance sometime in the future. Therefore, the effort for diversion effects on fisheries focused on developing through-Delta options for fisheries and on determining the risk and potential success of species recovery considering all available actions.

[*insert recommendations; final resolution of DEFT recommendations are pending***]**

The DEFT developed eight programmatic actions to maximize the chances of the through Delta conveyance meeting the CALFED purpose:

- Restore a wide range of depleted habitat types for spawning, rearing, and migrating resident and anadromous fish.
- Manage the volume, durations, and pathways of flow, nutrient inputs, and other factors to assure adequate food supply in the Delta.
- Improve screens, screen unscreened diversions, change diversion locations, and consolidate diversions to improve survival of fish at the point of diversions.
- Change operations to improve survival of fish and to protect and improve food supply.
- Establish appropriate environmental cues to improve survival of migratory fish through the Delta.
- Identify and reduce, eliminate, and/or trap inputs of toxics throughout the watershed to reduce or eliminate toxicity of water and sediment in Delta channels.
- Reduce loadings and mobilization of contaminants and metals to reduce body burdens of contaminants and metals in aquatic organisms as necessary to eliminate human health risks from eating these organisms.
- Manage fishing and associated mortality of wild stocks of Sacramento and San Joaquin salmon.

The DEFT is proceeding with evaluation of benefits, costs and institutional measures of suggested flexible operations. The DEFT and NoName teams are working together to develop a recommended through-Delta alternative that meets all of the CALFED objectives and principles. Of greatest concern is continuing exports from the south Delta and the associated entrainment and salvage of important fish species. To address this concern, both teams agree that a key component for most fish species is to provide new fish screen facilities to reduce direct entrainment and predation. Both teams also agree that fish losses can be reduced by an additional increment with flexible operations of the export pumps aided by more intensive use of real time monitoring. Flexible operations would allow reducing export pumping at times critical to fish and increasing export pumping at other times.

3.4 Summary of Response to Comments on Draft Programmatic EIS/EIR

The Draft Programmatic EIS/EIR was released for public review on March 16, 1998. The Program received 1836 individual public comment letters which included 469 speakers at 17 public hearings. Thousands of post cards, form letters and letter writing campaign letters were also received.

The top 5 public issues based on volume of comments have been identified as:

- Water Conservation
- New Facilities
- Agricultural Issues
- Area of Origin/ Water Rights
- Finance/ Beneficiary Pays

Conservation and storage received the largest number of comments. The comments associated with these two topics were generally linked, with those who believe water conservation is the sole solution being opposed to new facilities, and those who believe increased water conservation still will not solve the problem being in support of new facilities. The following summarizes how the Program is responding on each of these issues. ~~For more information on the major concerns within each of these issue areas, and how the Program is responding to them, see Attachment C.~~ CALFED will include a complete response to comment document with the Final Programmatic EIS/EIR in late 1999.

Response to Water Conservation Issues

Water conservation is an important part of any Bay-Delta solution. ~~Water conservation alone can not provide a complete and Program, and will contribute to a comprehensive solution to the~~

problems facing the Bay-Delta including a degraded Bay-Delta ecosystem, declining water quality, a levee system vulnerable to failure, or the uncertainty of water supplies to meet beneficial uses.

Water conservation, along with water recycling, is at the core of the Water Use Efficiency Program element. In the past two decades, many agricultural and urban water users have made significant improvements in their water use efficiency, and the Program intends to amplify these gains by further expanding the implementation of water use efficiency measures. To stimulate the implementation of these efficiency measures, the Program ~~has proposed that~~ will work with local, state, and federal government agencies provide both financial and technical assistance to water providers and water users. The Program has also recommended reporting mechanisms/processes to track the implementation of water use efficiency measures and to ensure compliance with water use efficiency targets/objectives.

Response to New Facility Issues

~~CALFED's basic strategy for Delta conveyance is to use the existing Delta configuration and channel modifications. Modifications to this through Delta conveyance strategy will only be made after thorough assessment of a variety of factors. For example, a decision to construct an isolated facility will be warranted if, after aggressive implementation of relevant common program elements and improvements to through Delta conveyance, there is still an inability to achieve CALFED goals. Reasons for considering an isolated facility would include a public health necessity for improved drinking water at the source arising from technical or economic infeasibility of meeting standards for safe drinking water through other methods, and/or an inability to achieve fishery recovery with continuing impacts of diversions from the south Delta.~~

CALFED's strategy is to develop a through-Delta alternative based on the existing Delta configuration with some modifications, evaluate its effectiveness, and add additional conveyance actions if necessary to achieve CALFED goals and objectives. The initial through-Delta conveyance will be continually monitored, analyzed, and improved to maximize the potential of the through-Delta approach meeting CALFED goals and objectives, consistent with its Solution Principles. If the through-Delta conveyance still fails to meet the CALFED goals and objectives, there will be a reassessment of the reasons and the need for additional Delta conveyance and water management actions.

If CALFED's goals and objectives cannot be accomplished by the through Delta conveyance strategy, the preferred program alternative includes additional actions that may be taken toward these goals and objectives after thorough assessment of a variety of factors. For example, a decision to construct an isolated facility may occur if, in combination with vigorous implementation of relevant common program elements and improvements to through Delta conveyance, and consideration of other water management options, an isolated conveyance facility is still deemed necessary. Such a facility would have to be demonstrated to be the most

cost effective and least environmentally damaging alternative, and to be necessary for significantly advancing CALFED's commitment to seek continuous water quality improvement.

An isolated conveyance facility also may be necessary if there is inability to achieve fishery recovery due to continuing impacts of diversions from the south Delta. A combination of these two factors also could result in construction of an isolated facility and/or other additional water management actions to meet CALFED goals and objectives after assessment of the effectiveness of the initial through Delta conveyance actions, and after a determination that such a facility would be effective in resolving these problems. These factors will be continually reevaluated during Stage 1 as part of the adaptive management process, and will form the basis for a comprehensive set of additional improvements in Stage 2.

Considering the magnitude of conflicts over available water in California, CALFED believes that it must aggressively evaluate and implement all available water management options to ensure water supply reliability. Therefore, aggressive implementation of water conservation, recycling, and a protective water transfer market are critically important for effective water management. New surface and groundwater storage will be constructed as necessary, considering appropriate implementation of nonstructural programs and demonstrated willingness to pay by potential beneficiaries, to meet CALFED's Program goals and objectives. During Stage 1, CALFED will evaluate and determine the appropriate mix of these water management tools.

Response to Agricultural Issues

The CALFED Program could result in the conversion of agricultural land for Program purposes such as ecosystem restoration, improved water supply reliability, and improved levee stability as the Program is implemented over the next 25 to 30 years. The Program intends to minimize the conversion of farmland, including prime and unique farmland, to the extent possible. In addition to its overall approach of acquiring land in voluntary transactions with willing sellers, CALFED is proposing to adopt several implementation policies that will minimize the adverse impacts to agricultural land and water resources. They include :

- Maintaining land in private ownership to the greatest extent practicable
- Prioritizing use of existing government owned lands for habitat restoration
- Working with local landowners and organizations to develop projects that meet CALFED objectives while also benefitting local landowners.

Agricultural water users throughout the state will benefit from various program elements. The objective of the Water Quality Program is to improve water quality for all beneficial uses of the Bay-Delta. The Long-Term Levee Protection Plan will bolster and maintain the Delta levees that protect important agricultural resources, infrastructure, habitat and water quality. The Water Use Efficiency Program will provide planning, technical, and financial assistance to agricultural water users to implement water use efficiency measures, which will help reduce agricultural

water costs. The Water Transfers Program will facilitate water transfers; agricultural water users can generate transferable water by implementing water use efficiency measures ~~and can acquire water in the transfer market to improve their water supply reliability.~~ New storage facilities could benefit agricultural water users by providing increased flood protection, increased water supply, and groundwater recharge. By recovering healthy populations of endangered or threatened species, the Ecosystem Restoration Program will help improve water supply reliability.

Response to Area of Origin/Water Rights Issues

The CALFED Bay-Delta Program is not proposing to change water rights law in California. Altering the state's system of water rights is beyond the mandate of the CALFED Bay-Delta Program, and the Program will operate within the system of existing water rights including existing laws and regulations protecting areas of origin. Although the State Water Resources Control Board is one of the CALFED agencies working to develop a long-term Bay-Delta solution, the Board retains its independent regulatory authority over water rights and water quality protection in California. The Board is engaged in water right hearings concerning the allocation of responsibilities to water right holders for meeting Bay-Delta water quality standards.

The CALFED Bay-Delta Program is designed to address a wide variety of problems and concerns affecting the Bay-Delta system. While it focuses on the Delta region, it has the potential for affecting land use throughout the vast solution area. CALFED seeks to accomplish its objectives in partnership with landowners, stakeholders, and communities throughout the solution area, being especially mindful of the potential impacts on private property owners and existing landowner rights.

Response to Finance/Beneficiary Pays Issues

CALFED will use a benefits-based approach to allocate the costs of the program. Simply put, those who benefit from the program will pay for their fair share of it. This means that a combination of both public and user funds will be needed. Many of the proposed program actions serve multiple benefits, including public benefits. These could include protection of key Delta functions including agriculture and levee system integrity, conveyance and ecosystem restoration.

CALFED has developed a cost draft financing plan, which is included with this report. It includes financial strategies which could be implemented in Phase III. A complete financial strategy for Stage 1 will be available at the time of the Record of Decision.

[*Moved 3.5 to 4.1***]**

4. DRAFT PREFERRED PROGRAM ALTERNATIVE

The description of the alternative is programmatic in nature, intended to help agencies and the public make decisions on the broad methods to meet Program purposes. The alternative is not intended to define the site specific actions that will ultimately be implemented. See Chapter 5 Implementation Plan for more specific Stage 1 actions.

The preferred program alternative for the CALFED solution is assembled from hundreds of programmatic actions. To help organize and simplify the discussion of the alternative, the actions are grouped under each of the eight program elements summarized below. These will be implemented in stages utilizing adaptive management over the next 30 years:

- **Long-Term Levee Protection Plan** - Provides significant improvements in the reliability of the Delta levees to benefit all users of Delta water and land.
- **Water Quality Program** - Makes significant reductions in point and non-point pollution for the benefit of all water uses and the Bay-Delta ecosystem.
- **Ecosystem Restoration Program** - Provides significant improvements in habitat, restoration of some critical flows, and reduces conflict with other Bay-Delta system resources.
- **Water Use Efficiency Program** - Provides support and incentives at the local level through expanded planning, technical, and financial assistance for efficient use of water for agricultural, urban, and environmental purposes.
- **Water Transfer Program** - Provides a framework of actions, policies and processes to facilitate, encourage, and streamline an active yet protective water market which will allow water to move between users, including environmental uses, on a voluntary and compensated basis.
- **Watershed Program** - Promotes locally-led watershed management activities and protections relevant to achieving the CALFED purpose through financial and technical assistance.
- **Storage** - Recognizes potential water supply and environmental benefits of new or expanded groundwater and surface storage. New storage will be included in the preferred program alternative as necessary to meet CALFED's goals, considering appropriate implementation of nonstructural programs and demonstrated willingness to pay by potential beneficiaries. During Stage 1,

CALFED will evaluate and determine the appropriate mix of these water management tools.

- **Delta Conveyance** - Provides a basic strategy for using through Delta channels to meet CALFED purposes. Modifications to this through Delta conveyance strategy will only be made after thorough assessment of a variety of factors. For example, inability to meet CALFED program goals for drinking water quality or fishery recovery using the basic strategy would warrant making a decision to move forward with modifications to this strategy including an isolated facility to carry a portion of export water around the Delta.

All of these will employ an adaptive management approach with careful monitoring of performance to help modify (adapt) future actions as more is learned about the system and how it responds. The implementation of the preferred program alternative is supported by an Assurances Plan, Financing Plan, and a Comprehensive Monitoring, Assessment and Research Program.

3.54.1 Staged Implementation and Staged Decision Making

The complexity of the Bay-Delta system and the inability to predict future events and how the system will respond to management actions requires that an adaptive management philosophy and process be employed for every program element.

CALFED has decided to implement the Program through stages. The preferred program alternative is composed of hundreds of individual actions that will be implemented and refined over the 20 to 30 year implementation period. Therefore, it is logical to implement the Program in stages according to major program milestones. The challenge in implementing the Program in stages is to allow actions that are ready to be taken immediately to go forward, while assuring that everyone has a stake in the successful completion of each stage.

Like implementation, the decision process will be

Staged Implementation

- **Identify certain actions at the outset (for all stages).**
- **Identify possible actions for future stages with associated conditions and linkages to guide the decisions.** This will allow some decisions when more scientific information will be available and the effects of previous actions will be better known.
- **Stage assurances that include specific agreements among agencies and stakeholders**

staged to allow better decisions in adaptive management at the appropriate time. The programmatic nature of the EIS/EIR provides the general direction for long-term implementation but not the specific information necessary for every decision required during the 20-30 year implementation period. Not all decisions need to, or can, be made at the outset of implementation. Therefore, stages will be identified where there are logical implementation milestones and decision making points. In this way, adaptive management can be applied equally well to a series of incremental actions such as ecosystem restoration or for major single decision projects such as surface storage or conveyance.

Staged implementation for the CALFED preferred program alternative involves identifying certain actions for implementation for which there is general agreement and justification, and also developing conditions for future decisions and for moving beyond Stage 1. For some actions, certain predefined conditions would need to be met before actions could proceed. For example, certain conditions would be linked to the decision to construct major facilities. **Conditional decisions**—These linked decisions on several program elements may be required at each stage of implementation. These require assurances that certain linkages, such as performance measures for each program element, are satisfied before making a decision to proceed.

~~The first stage begins a series of actions that will ultimately form the CALFED solution. Rather than leading directly to a specific, predefined outcome, the first stage initiates a process where the outcome is dependent on the results of adaptive management and future conditional decisions. In this way, the first stage could lead to a number of different outcomes with decisions made and implemented most intelligently based on real world experiences and data. As a result, the most cost-effective and environmentally sound actions can be implemented. The Stage 1 actions will be carefully selected to minimize the potential for spending money on improvements that would not be useful with the range of future implementation actions. At the same time, CALFED recognizes the need for adaptive management and that some Stage 1 actions may need to be refined as better information becomes available in the future. Stage 1 begins with a series of actions which are considered the most cost-effective and environmentally sound for the comprehensive, long-term CALFED solution. Stage 1 does not have a predefined outcome, since future implementation decisions are conditioned by what we learn from implementation experience and monitoring of results. Stage 1 actions will be carefully selected to minimize the potential for spending money on improvements that would not be useful, considering the range of future potential implementation actions. CALFED recognizes that some Stage 1 actions may need refinement, or other actions may be introduced, as information improves.~~

In order to succeed Stage 1 must:

- Result in overall continuous improvement for all resource areas for the Bay-Delta system.

- Provide stability in the water resources management framework ~~until actions in subsequent stages substantively reduce conflicts in the system and reduce conflicts in the system.~~
- Improve conditions in the Bay-Delta system for listed and proposed species. These actions can provide for species protection and begin the process of recovery.
- Have a mix of public and private funds based on "beneficiary pays" principle.
- Build the information base for the transition to Stage 2.
- Address the conditions and linkages (assurances) necessary before proceeding with storage and conveyance.
- Include an ongoing public stakeholder process ~~or information dissemination to provide and input to the decision making and adaptive management process.~~
- ~~Include, wherever possible, measurable performance goals or indicators of success for all Program goals areas.~~
- Complete implementation ~~plan agreement~~ to finish Stage 1 and to move to subsequent stages for each program element:
 - Refine implementation ~~plan agreement~~ for the long-term levee protection plan
 - Refine implementation ~~plan agreement~~ for the water quality program
 - Refine implementation ~~plan agreement~~ for the ecosystem restoration program
 - Refine implementation ~~plan agreement~~ for the water use efficiency program, water transfer program, and storage as a bundle to meet CALFED water supply reliability goals.
 - Refine implementation ~~plan agreement~~ for watershed program
 - Refine implementation ~~plan agreement~~ for conveyance

CALFED will continue work ~~between the Revised Draft EIS/EIR and the~~ until release of the Final EIS/EIR in late 1999 on grouping the Stage 1 actions into a series of bundles (packages) which can provide additional assurances for balancing benefits. For example, a bundle of actions in the Delta could include levee work, habitat improvements, water quality work, and facilities and operations to improve water supply reliability. Bundles for some actions may be geographical, based on timing, oriented around permitting needs like Clean Water Act Section 404, or other grouping. Linking the actions would assure that they all move forward together. These may be linked within the same site specific EIS/EIR, tied by contractual documents, dependent on the same funding, or other means.

Discussion is continuing on conditions and linkages for a draft preferred program alternative. There are many potential linkages (many are assurance issues) among the various actions in the draft preferred alternative, which includes common program elements, storage, and conveyance. Future conditional decisions can be made depending on how the conditions and linkages are

satisfied.

There is generally broad agreement on proceeding with the program elements for water quality, water use efficiency, ecosystem restoration, levee system integrity, water transfer framework and the watershed program, but only if implementation is linked to reasonable progress in all program elements. However, there is not agreement on the need for surface storage and dual Delta conveyance (with isolated facility) to achieve the CALFED purpose.

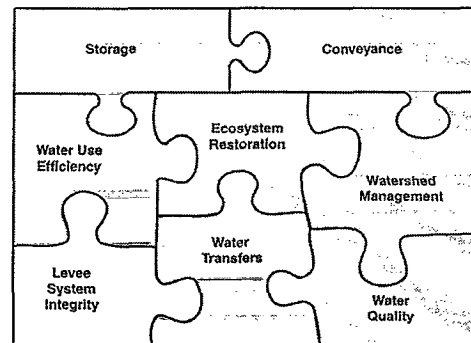
Meeting the CALFED mission statement and goals is dependent on improvement in all problem areas (ecosystem, water quality, levee system integrity, and water supply reliability). Linkages between improvement in the problem areas are key to consistent and continuous progress towards meeting the CALFED purposes. The eight program elements and linkages between the elements are the mechanisms to achieve improvement in the four problem areas.

4.12 Program Elements

Meeting the CALFED purpose is dependent on improvement in all four problem areas (ecosystem, water quality, levee system integrity, and water supply reliability). The eight program elements and linkages between the elements are the mechanisms to achieve improvement in the problem areas.

Long-Term Levee Protection Plan

The Sacramento-San Joaquin Delta is an area of great regional and national importance, which provides a broad array of benefits including agriculture, water supply, transportation, navigation, recreation and fish and wildlife habitat. Delta levees are the most visible man-made features of this system. Historically, the levee system has been viewed as a means of protecting other resources. However, Levees are an integral part of the Delta landscape and are key to preserving the Delta's physical characteristics and processes including definition of the Delta waterways and islands.



Identifying and Managing the Total Risk to Delta Levees

Delta levees are at risk of failure from earthquakes, floods, subsidence, seepage and other threats. The Levee Program is taking steps to identify the total risk to Delta levees and present a suite of options to manage this risk.

Over the past year a seismic investigation was made by a group of experts in the fields of seismology and geotechnical engineering. The results of this investigation found that a sizeable but manageable seismic risk is present.

In an effort to further quantify the total risk to levees, CALFED has requested this group, headed by DWR's Division of Engineering, answer the following questions:

1. Perform a total risk assessment. Identify all contributors to levee risk and quantify the total risk.
2. Provide recommendations for seismic upgrades to critical Delta levees. Include an evaluation of the reduction in levee vulnerability and cost estimates, (\$/mile), for various typical upgrades.
3. Review the Subsidence Subteam's report and comment on the concept of a zone of influence and the influence of inner island subsidence on levee integrity and other CALFED programs.
4. Review the Levee Program's CMARP scope, particularly the CMARP recommendations for subsidence, emergency response, and seismic risk assessment. Comment on the proposed scopes and develop cost estimates for completing the monitoring, assessment and research.

Once the total risk to Delta levees is quantified and the consequences evaluated, CALFED will implement an appropriate risk management strategy.

Several risk management options have been developed for inclusion in the CALFED Preferred Program Alternative. The available risk management options include:

- Improving emergency response capabilities
- Developing storage south of the Delta
- Reducing the fragility of the levees
- Improving through-Delta conveyance
- Releasing more water stored north of the Delta
- Curtailing Delta diversions
- Continued monitoring and analysis of total risk
- Constructing an isolated facility

The final Risk Management Plan may include a combination of these options.

Given the numerous public benefits protected by Delta levees, the focus of the Long-Term Levee Protection Plan is to improve levee stability. The levee plan will build on the successes of existing programs in achieving its goals. There are five main parts to the levee protection plan:

- **Base-Level Protection Plan** - Base-level funding provides equitably distributed funding to participating local agencies in the Delta. One of the primary goals of the CALFED Program is to reconstruct all Delta levees to a particular standard. CALFED has tentatively selected the U.S. Army Corps of Engineers PL 84-99 standard. Base level funding will provide for reconstruction of Delta levees to the PL84-99 standard and for actions required by local agencies to maintain levees at the PL84-99 standard. Required levee work may include removal of vegetation and debris, maintenance of water control devices, repair or replacement of existing bank protection, addition of material to achieve required cross section, removal of flood deposits, extermination of burrowing rodents, repairing and shaping access roads, repairing slipouts and erosion damage, dredging as required for minor repairs, controlling vegetation on the waterside of the levee, and other actions necessary to maintain levee integrity and appurtenances. This component will seek continuity with and build on the successes of the Delta Levee Subventions Program which is currently administered by DWR.
- **Special Improvement Projects** - The special improvement project funding continues a funding mechanism for special habitat improvement and levee stabilization projects to augment the base-level funding ~~at the discretion of the program manager~~, within specific policy guidelines. Under the special improvement projects, flood protection would be enhanced for key islands that provide statewide benefits to the ecosystem, water supply, water quality, economy, and the infrastructure. Special improvement project funding is based on the benefit to the public, not solely on the need for improvement. This component will seek continuity with and build on the successes of the Special Flood Control Protections Program which is currently administered by DWR.
- **Delta Island Subsidence Control Plan** - Subsidence has played a key role in bringing the Delta islands to where they are today: relatively tall levees protecting interiors below sea-level. ~~The Levee Program will promote land management and levee maintenance practices to reduce subsidence that affects the levee system.~~ The Levee Program will implement current BMPs to correct subsidence on levees and coordinate research to quantify the effects and extent of inner-island subsidence as it relates to all CALFED objectives. Subsidence control measures will be implemented through the Special Projects ~~base-level protection~~ component of the Levee Program and supplemented by research to develop BMPs through grants through the existing special project program.

- **Emergency Management Plan** - The most recognizable threat to Delta islands and resources in the Delta is inundation due to winter flood events. In addition, other potential disasters can be caused by high tides and high winds, earthquakes, burrowing animals whose actions can cause levees to fail, toxic spills, failure of Delta levees during low flow periods, and fire. Approximately 20 islands have flooded since the 1960s, including repeated flooding of some islands. The emergency management plan will build upon existing state, federal, and local agency emergency management programs to improve protection of Delta resources in the event of a disaster.
- **Seismic Risk Assessment** - Earthquakes can cause levees to fail by slumping or liquefaction of underlying soils. To date, there have been no known Delta island inundations as a result of seismic events. However, there are several active faults located sufficiently close to the Delta to present a threat to Delta levees. The seismic risk assessment will continue to refine the evaluation of the potential performance of the existing levee system during seismic events as well as explore risk reduction strategies. Identify and increase the understanding of seismic risks to Delta resources and develop recommendations to manage the risk.

~~Delta channel modifications for conveyance may require setback levees along the alignment or a different levee cross section depending on channel flows and velocities. The levee cross sections in places may vary depending on locations selected for levee-associated habitat.~~

Overall benefits of the Delta Long-Term Levee Protection Plan include:

- Funding for upgrade and continued maintenance of levees to protect Delta functions
- Suitable funding, equipment and materials availability, and coordination to rapidly respond to levee distress and failures
- Subsidence reduction helps long-term Delta system integrity
- Increased reliability for water supply needs from the Delta and in-Delta water quality
- Increased reliability for in-Delta land use

Long-Term Levee Protection Plan

Facts and Figures

- Helps protect land uses, water quality, and water supply reliability.
- Provides new opportunities for habitat.
- Meets Program objectives for reducing vulnerability to the Delta system. However, seismic risk is uncertain.
- Requires additional research on seismic vulnerability.
- Could exceed \$ 1.5 billion over 20-30 years or more. Annual investment rates may exceed \$3050 to \$3555 million.

- Increased reliability for in-Delta aquatic and wildlife habitat

More information on the levee program will be included in the revised *Long-Term Levee Protection Plan*.

Work is continuing on the following issues:

~~**Subsidence** - There is a lack of concurrence on the extent that subsidence affects levee integrity. The various positions on subsidence impacts to levee integrity are presented in the Long-Term Levee Protection Plan. The Subsidence Sub-Team will continue to meet regularly until this issue is resolved. The goal is to reach a consensus opinion on the issue by the time the final draft Long-Term Levee Protection Plan is issued with the Final Programmatic EIS/EIR in late 1999.~~

Suisun Marsh Levees - CALFED is investigating the merits of including the Suisun Marsh levee system in the Levee Program. At this point, the following two options are being considered:

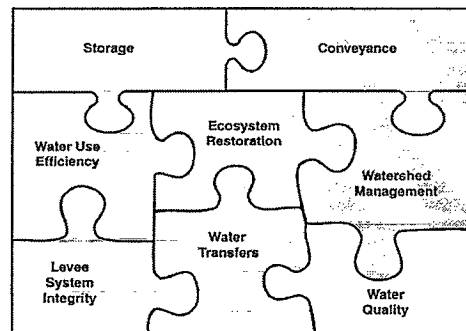
1. Include all the exterior levees (approximately 230 miles) into CALFED's Levee Program. The existing "Suisun Marsh Exterior Levee Standard" would be adopted.
2. Protect part of the levee system. Reconfigure the Marsh to protect existing managed wetlands and develop new tidal wetlands. Some landowners have expressed opposition to this alternative because it would affect their current land use.

In 1999, CALFED staff will further develop these two options, by completing the following tasks:

- Get additional stakeholder (including local landowners) input
- Develop various Marsh configurations to study
- Quantify benefits
- Perform two-dimensional system modeling on various Marsh configurations to determine how they affect water quality in the marsh and in the Delta
- Quantify Ecosystem Restoration Plan linkages
- Develop feasibility level cost estimates
- Document results in the Long-Term Levee Protection Plan (The potential impacts of including the Suisun Marsh levee system into the Levee Program are documented in the Draft Programmatic EIS/EIR)
- Develop alternative funding sources

Water Quality Program

The draft Water Quality Program includes programmatic actions to further CALFED is committed to achieving continuous improvement in the Program's goal quality of providing good water quality for environmental, agricultural waters of the San Francisco Bay-Delta estuary until no ecological, drinking water, industrial, and recreational or other beneficial uses of water the waters are impaired by water quality problems, and to maintaining this quality once achieved. While some actions are sufficiently developed for early implementation, others rely on comprehensive monitoring and future research to improve our understanding. This objective extends to the watersheds of effective water quality management and to control the estuary to the extent that water quality problems at their sources in these watersheds affect beneficial uses dependent on the estuary.



Determining impairment to "Continuous" as used here means a water quality beneficial use is often difficult and complicated steady or step-wise trend over the 30-year time horizon of the CALFED Program, and does not include short-term fluctuations that may be brought about by wet or dry hydrologic conditions, other shorter term, temporary, events or time needed to initiate and implement improvement measures. For some beneficial uses, such as drinking water. Although specific water quality targets have been established to gauge the success of the Water Quality Program, CALFED commits to seeking water quality that exceeds these targets where feasible and agricultural water use, impacts on use are generally well characterized cost effective.

For other beneficial uses such as The Water Quality Program contains numerous actions directed at improving the quality of water to support ecological resources and to protect CALFED investments in ecosystem use, impacts on species are not as well characterized restoration projects. The Program has relied on Other program actions are directed at improving the technical expertise of a variety of stakeholders to define approaches to solving water quality of Delta waters to support problems agricultural and recreational uses of the resource. The Water Quality Program actions include Drinking water supply is another important beneficial use of Delta waters, as the Delta is a combination source of research, pilot studies, and targeted activities. This approach allows actions drinking water to be taken on known water quality problems and sources of those problems, while allowing further monitoring and research of potential problems and solutions about two-thirds of the State's population. Drinking water elements of the Water Quality Program are emphasized in this section because, unlike other water quality aspects, drinking water issues have great significance to the selection of a Preferred Alternative.

Water Quality Targets

For many water quality parameters, numerical and/or narrative objectives for the protection of ecological and other beneficial uses already exist in water quality control plans adopted by the State and Regional Water Quality Control Boards. The CALFED Water Quality Program has adopted regulatory objectives where appropriate as its targets for water quality improvement, such as for selenium and mercury. For some water quality parameters, objectives do not presently exist. This is particularly true for drinking water that receives further treatment prior to use (see page). As the Water Quality Program evolves, it is anticipated that periodic re-evaluation of water quality targets will be one feature of adaptive management as applied to this program.

With respect to drinking water beneficial uses, the CALFED objective is to continuously improve source water quality that allows for municipal water suppliers to deliver safe, reliable, and affordable drinking water that reliably meets, and where feasible, exceeds applicable drinking water standards. CALFED program actions will be aimed at reducing the levels of bromide, organic carbon, and pathogens in Delta drinking water sources. CALFED's target for providing safe, reliable, and affordable drinking water in a cost effective way is to achieve either: a) average concentrations at Clifton Court Forebay and other south and central Delta drinking water intakes of 50 ug/L bromide and 3.0 mg/L total organic carbon; or b) an equivalent level of public health protection utilizing a cost effective combination of alternative source waters, source control, and treatment technologies.

Continuous improvement of Central and South Delta water quality from current average conditions will be a Stage 1 objective as part of the first bundle of Stage 1 projects.

Enabling Delta water users to substitute higher quality source water for Delta water offers important opportunities to provide safe drinking water, and will be intensively investigated as a Stage 1 approach within the CALFED Program. However the importance of developing adequate source water quality in the Delta cannot be ignored.

In seeking to meet its commitment to provide urban agencies with water sufficient in quality to produce safe and affordable drinking water that meets and, where feasible, exceeds standards for public health protection, CALFED will consider additional water management options including, but not limited to, provision of alternate sources, use of storage facilities to improve drinking water quality, and an isolated facility to provide source water of better quality. The degree of improvement needed, if any, will be determined based on developments in treatment technologies, future regulatory directions and results of new health effects studies. CALFED plans an active role in fostering development of the information that will make such determinations possible.

Drinking water supplies from the Delta contain higher bromide concentrations than are found in

the drinking water supplies of about 90% of the nation. Bromide (a salt) reacts with disinfection chemicals to form harmful chemical byproducts that have increasingly raised health concerns for consumers. Most of this bromide comes from the ocean as a result of its connection with the Sacramento-San Joaquin Bay-Delta estuary, and will continue to impact the quality of water exported by the state and federal projects.

Therefore, unlike most of the other water quality parameters of concern to CALFED, the choice of CALFED conveyance options can profoundly influence concentrations of bromide and other salts in Delta waters. The bromide question is, therefore, inseparably linked to conveyance and other water management options to improve source quality within the CALFED program. See *Conveyance*, p. ____.

Program Actions

The Water Quality Program has relied on the technical expertise of a variety of stakeholders to define approaches to solving water quality problems, and to develop programmatic actions to meet CALFED objectives. While some actions are sufficiently developed for early implementation, others rely on comprehensive monitoring, pilot studies, and research to improve our understanding of effective water quality management and to influence future actions to control water quality problems at their sources. This approach allows actions to be taken on known water quality problems and sources of those problems, while allowing further monitoring, research, and testing of potential problems and solutions. Actions will be adapted over time to ensure the most effective use of resources.

In summary, the draft Water Quality Program component includes the following broad categories of programmatic actions:

- **Drinking Water - Increase source water quality and treatment technology to reduce potentially toxic and carcinogenic disinfection by-products by controlling Parameters** - Reduce the loads and/or impacts of bromide, total organic carbon (TOC), pathogens (controlling inputs from rangelands, nutrients, salinity, and turbidity dairies, and confined animal facilities), through a combination of measures including source reduction, alternative sources of water, treatment, and storage and bromides. The quality of drinking water supplies taken from the Delta will be improved conveyance improvements.
- **Pesticides** - Reduce impacts of pesticides (including diazinon and chlorpyrifos) through development and implementation of Best Management Practices, for both urban and agricultural uses, and support of pesticide studies and pilot projects for regulatory agencies while providing education and assistance in implementation of control strategies for the regulated pesticide users.

- **Organochlorine pesticides** ~~Pesticides~~ - Reduce the load of organochlorine pesticides in the system, including residual DDT and ~~Chlordane~~ chlordane, by reducing runoff and erosion from agricultural lands through Best Management Practices. Sediment control will also protect valuable topsoil and prevent costly maintenance of drainage systems.
 - **Trace Metals** - Reduce impacts of trace metals such as copper, cadmium, and zinc in upper watershed areas, near abandoned mine sites. Reduce impacts of copper through urban stormwater programs and agricultural Best Management Practices. Study the ecological impacts of copper in the Delta. Determine the feasibility of copper reduction.
 - **Mercury** - Reduce mercury in rivers and the estuary by source control at inactive and abandoned mine sites. ~~Also, study bioavailable~~ Determine current mercury levels in the rivers, water, sediment and fish in the estuary, rivers and its potential threat to human health affected tributaries. Implement comprehensive monitoring and research program to determine loadings and sources of total and methyl mercury, transport of mercury in sediment, factors affecting mercury transformation and bioaccumulation in the estuary, and concentrations of mercury in indicator species. Use this information to prioritize remediation or cleanup of mercury sources.
 - **Salinity** ~~Selenium~~ - Reduce salinity ~~selenium~~ impacts through reduction of leaching of agricultural land via irrigation improvement loads at their sources, crop selection, increased flow, and changes in land use ~~assimilation of discharges with flow.~~ **Turbidity and Sedimentation** - ~~Reduce turbidity and sedimentation which affect several hydraulic areas in the Bay Delta and its tributaries, including treatment of drinking water sources.~~
- Selenium** - Reduce selenium, through irrigation control, crop selection, and possibly land

Further research is needed for some water quality problems.

For example, for some parameters of concern, such as mercury, not enough is understood about its sources, the bioavailability of mercury to various species, factors contributing to its bioavailability, and the load reductions needed to reduce fish tissue concentrations necessary for human consumption. For example, as to mercury, not enough is understood about the relative contribution of various mercury sources; factors affecting the transformation of mercury from one form into another (particularly the formation of methyl mercury, the most bioavailable form); specific control measures that will reduce the levels of bioavailable mercury within the estuary; and, ultimately, the level of load reductions needed to reduce fish tissue concentrations to levels that will render the fish safe for human consumption. In addition, research is needed to determine what effect wetlands restoration activities will have on the bioavailability of mercury in soils in these restoration areas.

allowing or land retirement. Impacts of selenium will be further reduced by real-time management of selenium laden agricultural drain water released to the San Joaquin River to minimize concentrations in the river when selenium discharges occur.

Reduce imports of salt and study non-agricultural source contributions. Salinity reductions in the river would also incorporate real-time management of salt discharges. San Joaquin drainage problems have been evaluated in several studies over the past two decades. Complete resolution of the San Joaquin drainage problems is beyond the scope of the CALFED Bay-Delta Program. In the San Joaquin drainage problems have been evaluated in several studies over the past two decades. Reduced loads would be accomplished through implementation of on-farm and district source control measures, development of treatment technology, land retirement through CVPFA, and implementation of pilot projects such as the Grasslands Bypass Use Agreement if the five year test proves successful. Complete resolution of the increased flow will result from FERC actions on San Joaquin drainage problems is beyond the scope of the CALFED Bay-Delta Program VAMP. Selenium impacts from industrial sources in the Suisun Bay will be reduced by improved source control.

Selenium - Reduce selenium, through irrigation control, crop selection, salinity - Actions are planned to reduce salt sources in urban and possibly land fallowing or land retirement industrial waste water to protect drinking and agricultural water supplies, and to facilitate development of successful water recycling, source water blending, and groundwater storage programs. Impacts of selenium will be further reduced by real-time management of selenium laden agricultural drain water released to the San Joaquin River watershed, a strategy should be developed using a continuous monitoring technology to minimize concentrations in water quality impacts of salt movement through river when selenium discharges occur the system. This strategy will be consistent with CVPFA and VAMP requirements. CALFED will not pursue resolution of salinity problems of the San Joaquin Valley through a San Joaquin Valley Drain, which is beyond the scope of the CALFED Program. Long term solutions will be sought through the San Joaquin Valley Drainage Implementation Program, with CALFED support. Salinity in the Delta will be controlled both by limiting salt loadings from its tributaries, and through managing sea water intrusion by such means as using storage capability to maintain Delta outflow and to adjust timing of outflow, and by export management.

Turbidity and Sedimentation - Reduce turbidity and sedimentation which affect several hydraulic areas in the Bay Delta and its tributaries, including treatment of drinking water sources. Turbidity and Sedimentation - Reduce turbidity and sedimentation which affect several hydraulic areas in the Bay Delta and its tributaries, including treatment of drinking water sources. Several hydraulic areas in the Bay Delta and its tributaries. Study ecological impacts of sedimentation. Control sedimentation in several watersheds to protect spawning beds and maintain capacity of streams.

- **Low Dissolved ~~oxygen~~Oxygen** - Reduce impairment of rivers and the estuary caused by substances that exert excessive demand on dissolved oxygen. Oxygen depleting substances are found in waste discharges, agricultural discharges, urban stormwater, sediment, and algae.
- **Toxicity of Unknown Origin** - Through research and monitoring, identify parameters of concern in the water and sediment within the Delta, Bay, Sacramento River and San Joaquin River regions and implement actions to reduce their toxicity to aquatic organisms.

Bromide and Organic Carbon Management

An analysis (currently under peer review) of bromide and organic carbon sources in Delta drinking water supplies was undertaken to develop a realistic expectation of what level of reductions in bromide and organic carbon concentrations might be expected as a result of Water Quality Program actions. This analysis indicates that the Pacific Ocean ~~and is the San Joaquin River are the most important sources~~ predominant source of bromide in Delta waters. Further analysis of the San Joaquin River indicated that about 80% of the bromide found there can be accounted for by bromide entering the Delta through the Central Valley Project pumps at Tracy. Evidence suggests that other sources of bromide, such as pesticide use in the Valley or natural sources in San Luis Reservoir are not as important; therefore, it appears that a large majority of bromide found in the San Joaquin River is from recirculated Delta water containing bromide from the ocean. This bromide analysis indicates that, because bromide in Delta drinking water supplies comes mostly from the ocean, it is probably not possible for water quality actions to reduce bromide concentrations by more than 20% at best.

Water flowing through the Delta to municipal water intakes picks up additional organic carbon. Studies have demonstrated that a majority of this added carbon comes from drainage off Delta islands. Organic carbon, unlike bromide, is subject to removal, at least to some extent, through conventional water treatment processes. While a number of practical problems would affect the feasibility and economics of reducing organic carbon to acceptable levels, it appears to be at least theoretically feasible to meet this objective through water quality program actions involving land and water management and treatment either on Delta islands or at treatment plants, and relocation of agricultural discharges away from municipal supply intakes. Other management actions could include timing of diversions, separation of drinking water supplies, and blending with higher quality source waters. Storage capability can provide important flexibility for enabling these water management actions to be successful. Further studies will be required to more fully quantify the results of potential water quality actions, and to establish the feasibility of implementing these actions.

Storage can help timing for release **Coordination Between CALFED and Other Responsible**

Agencies

Success in achieving the CALFED water quality objectives through the CALFED Water Quality Program will pollutants remaining after source control efforts. Improved conveyance to south Delta export pumps depend upon close coordination and collaboration between the State Water Resources Control Board, Regional Water Quality Control Boards, California Environmental Protection Agency, California Department of Health Services, U.S. Environmental Protection Agency, and other responsible State and Federal agencies, in implementation and regulation of water improve water quality for those diversions but may decrease quality for in-Delta diversions quality targets, goals, objectives and standards for municipal wastewater discharges, urban and agricultural runoff, and agricultural and mine drainage to the Delta and its tributaries. Water use efficiency measures can improve water quality entering In 1999, CALFED will establish a working group of stakeholders and agency representatives to identify appropriate linkages, develop specific coordination mechanisms, and regulatory actions to assure the Delta by reducing some agricultural and non-agricultural discharges containing pollutants actions of other agencies are consistent with and conducive to meeting CALFED's water quality goals.-

Wastewater reuse depends on high quality water Relation to prevent salt damage Other Program Elements

Other components of irrigated land or corrosion of industrial equipment the CALFED Program can affect water quality.

Potential benefits of Surface storage can help in the Water Quality Program include:

management of flows and improve water quality by providing additional storage for higher quality, wet period flows and for blending. As previously discussed, improved conveyance to south Delta export pumps can substantially improve water quality for those diversions. However, such changes have the potential to change the quality of water in Delta channels, either for the better or worse. Water use efficiency measures can improve water quality entering the Delta by reducing some agricultural and non-agricultural discharges containing pollutants, but also have the potential to decrease water quality. Ecosystem restoration actions may degrade drinking water quality by increasing organic carbon loads; therefore these actions will need to be structured so as to assure adverse water quality impacts do not occur.

Water quality can affect the ability to expand water use efficiency measures such as conservation, wastewater reuse, and conjunctive use, all of which depend on the availability of high quality water to prevent salt damage of irrigated land or groundwater basins, prevent corrosion of industrial equipment, and to achieve blended water salinity objectives.

In the event of a catastrophic levee failure in the Delta, the amount of saline water entering the system could be such as to make Delta waters unusable for many months. Besides making the

water unusable for agricultural, industrial, or domestic purposes, it could also destroy delicate ecosystem balances and ruin CALFED investments in ecosystem restoration. Therefore, it is difficult to overestimate the importance of a successful Delta levee program to achieving and maintaining good water quality for the beneficial uses of Delta waters.

The CALFED Comprehensive Monitoring, Assessment, and Research Program (CMARP) will be the primary vehicle for measuring the extent to which continuous water quality improvement is achieved. Performance will be measured by comparing ambient water quality (where appropriate) to specific water quality objectives that have been established for the parameters of concern. An independent panel established to evaluate the progress of the Stage 1 water quality actions against objectives will also provide oversight of the CMARP effort as part of its reports to CALFED and the California Legislature.

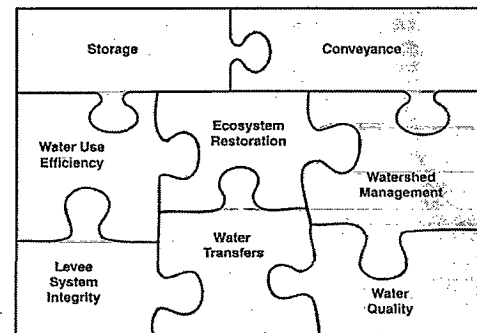
More information on the water quality program will be included in the revised *Water Quality Program Plan*.

~~More information on the water quality program will be included in the revised *Water Quality Program Plan*.~~

~~Improves the potential for wastewater reclamation to improve water use efficiency. Reduces concentration of compounds contributing to disinfection byproduct formation potential and degradation of drinking water supplies. Improves drinking water quality and public health benefits. Improves water quality for the ecosystem by reducing toxicants as a limiting factor. Improves Delta water quality by reducing the volume of urban and agricultural runoff/drainage and concentration of pollutants entering the Delta.~~

Ecosystem Restoration Program

The Ecosystem Restoration Program (ERP) is the principal mechanism that CALFED will use to restore the health of the Bay-Delta ecosystem. The overarching goal of the ERP is to improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta to support sustainable populations of diverse and valuable plant and animal species. The ERP is composed of described in three volumes: Volume I contains vision statements that describe the ecological attributes and desired future Bay-Delta conditions; Volume II outlines over 700 programmatic restoration actions for the 14 ecological management zones delineated within the Bay-Delta ecosystem; and the Strategic Plan describes the ecosystem-based, adaptive



management approach that will be used to implement the restoration program.

The ERP is predicated upon an ecosystem-based management approach that emphasizes the restoration of ecological processes. By restoring the natural processes that create and maintain diverse and vital habitats, the ERP aims to meet the needs of multiple plant and animal species while reducing the amount of human intervention required to maintain habitats. Through this ecosystem-based approach, the ERP will contribute to or assist in the recovery of endangered and threatened species that use the Bay-Delta, and it will help improve the population abundance and distribution of unlisted plant and animal species, thereby reducing or precluding future species listings. In this manner, the ERP will help reduce conflicts between endangered and threatened species and water supply opportunities.

Because the Bay-Delta ecosystem is large, complex, diverse and variable, it is impossible to know with certainty how it will respond to implementation of the ERP and other Program components. Although we know much about how the Bay-Delta functions, there are still significant information gaps that hamper our ability to sufficiently define problems and design restoration actions to address them. To account for this uncertainty, the ERP uses an adaptive management approach to restoring and managing the Bay-Delta ecosystem. In an adaptive management approach, restoration actions are designed and monitored so that they improve our understanding of the system while simultaneously restoring it. This approach allows revision of restoration activities or better design future restoration actions based upon the information gathered from projects implemented earlier. It also provides the flexibility required to respond to changing Bay-Delta conditions and to identify and address resource conflicts and trade-offs.

CALFED convened a group of technical experts to develop the Strategic Plan for the ERP. Expert panels/groups will continue to advise the CALFED Program. The Strategic Plan outlines the following steps as part of the adaptive management approach:

- Define the problem or set of problems to be addressed
- Define goals and objectives for resolving identified problems
- Develop conceptual models
- Develop and design alternative restoration or management actions
- Implement restoration actions
- Monitor the ecosystem
- Update restoration and management actions

CALFED will use this adaptive management process to refine and implement the 700 programmatic restoration actions contained in the ERP. Representative ERP actions include:

- Restoring, protecting, and managing diverse habitat types, ~~including representative native habitat communities~~ representative of the Bay-Delta and its watershed.

- Restoring critical instream and channel-forming flows in Bay-Delta tributaries.
- Improving Delta outflow during key springtime periods.
- Reconnecting Bay-Delta tributaries with their floodplains through the construction of setback levees, the acquisition of flood easements, and the construction and expansion of flood bypasses.
- Developing prevention and control programs for invasive species.
- Restoring aspects of the sediment regime by relocating instream and floodplain gravel mining, and by artificially introducing gravels to compensate for sediment trapped by dams.
- Reducing or eliminating fish passage barriers, including the removal of dams, construction of fish ladders, and construction of best available technology fish screens.
- Targeting research to provide information needed to define problems sufficiently and to design and prioritize restoration actions.

More information on the ecosystem restoration program will be included in the revised *Ecosystem Restoration Program Plan*.

CALFED seeks to preserve as much agricultural land as possible during implementation in Phase III consistent with meeting all Program goals. Some of the land needed for Program implementation is already owned by the government and that land will be used when appropriate.

Partnerships with landowners, including easements, will be pursued when appropriate to obtain mutual benefit if the appropriate government land is not available. Acquisition of fee title to land from willing sellers will be used when neither available government land nor partnerships are appropriate or cost effective for the specific need.

Many entities have expressed concerns about the effects of the CALFED Program (including especially the ERP and levee programs) on agricultural land. Agriculture resources are an important feature of the existing environment of the state and are recognized and protected under CEQA and state and federal policy. One of the major principles of the State's environmental agricultural policy is to sustain the long-term productivity of the State's agriculture by conserving and protecting the soil, water, and air which are agriculture's basic resources. It is CALFED policy that adverse environmental effects to agricultural resources resulting from CALFED programs, projects, and actions will be fully assessed and disclosed under CEQA, and avoided or mitigated as required by CEQA. Assessment, disclosure, and avoidance and other

mitigation strategies shall be developed at the programmatic and project-specific levels in consultation with other state, federal, and local agencies with special expertise and authority over agricultural resources which may be affected by the Program, such as California Department of Food and Agriculture.

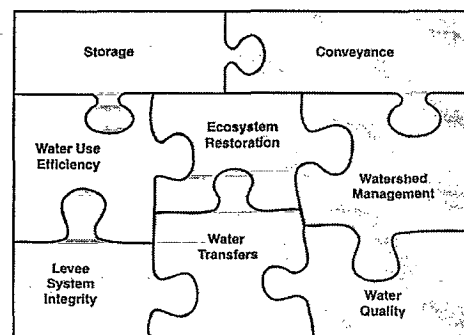
CALFED agencies have committed, through the July 1994 Framework Agreement, to promote maximum coordination, communication, and cooperation among themselves and other interests. CALFED agencies have also agreed that coordination shall not constrain or limit the agencies in carrying out their statutory responsibilities. Numerous activities and programs are ongoing or proposed that convert agricultural land to habitat for fish, wildlife, and wetland purposes. Examples are actions being taken through the Central Valley Project Improvement Act and the Central Valley Habitat Joint Venture to protect and restore significant areas of land in the Central Valley. To the extent that these activities and programs establish habitat that is also proposed in the ecosystem restoration program, that habitat reduces the amount of habitat that is needed to achieve the ecosystem restoration program goals. Also, to the extent that these activities and programs propose water acquisition for specific watersheds that is also proposed in the ecosystem restoration program, that water reduces the amount of water that is needed to achieve the ecosystem restoration program goals. Every effort will be made to fully integrate actions being taken by the various state, federal, and local agencies with the CALFED Program.

Several entities have expressed concern that CALFED is not directly focusing on promoting the health of San Francisco Bay, particularly the Central and South Bay areas. It is true that the Program has not included San Francisco Bay as part of its defined problem area (which includes the legally defined Delta, Suisun Bay extending to Carquinez Strait, and Suisun Marsh). Nevertheless, because the Bay-Delta system is part of a larger water and biological resource system, solutions to address the problems in the system will include a broader geographic scope extending both upstream and downstream. This solution scope includes San Pablo Bay, San Francisco Bay, and portions of the Pacific Ocean out to the Farallon Islands. In particular, the Program will address interactions between the Delta and San Francisco Bay, such as flow or sediment, by examining the "inputs" and "outputs" from the defined problem area. In addition, given CALFED's solution principle that solutions should have no significant redirected impacts, consideration needs to be given to how each alternative might negatively affect San Francisco Bay. The Draft Programmatic EIS/EIR evaluates impacts (both adverse and beneficial) of the CALFED alternatives on the San Francisco Bay region.

Many stakeholders have recommended that CALFED give serious consideration to restoring salmon runs below Friant Dam on the San Joaquin River as a means of attaining ERP goals. For example, some have suggested that this goal could be coupled with a tailored water transfer and groundwater storage program to attain multiple CALFED objectives. CALFED will continue to evaluate restoration of salmon in the mainstem San Joaquin River as a part of the ERP, while remaining cognizant of the special hydrological and water management considerations in the San Joaquin basin.

Water Use Efficiency Program [****mostly replaced****]

The CALFED Water Use Efficiency Program will 1) establish measurable objectives, 2) offer support and incentives through expanded programs to provide planning, technical, and financial assistance; 3) monitor progress towards objectives; and, 4) if these objectives are not met, provide for the reconsideration of other management options. CALFED agencies will also support institutional arrangements that give local water suppliers an opportunity to demonstrate that cost-effective efficiency measures are being implemented. Some potential water use efficiency benefits, such as water quality improvements, may be regional or statewide rather than local. These are situations in which CALFED planning and cost-share support may be particularly effective.



Water use efficiency measures can make available additional water supplies for environmental or consumptive users, and can serve as a useful tool for addressing many of the problems in watershed management. Improvements in water use efficiency are anticipated from a wide range of CALFED programs, and not all of these are reflected in this discussion of the Water Use Efficiency Program. As with other program elements, actions and activities undertaken throughout the CALFED Program can have corollary benefits in other CALFED program areas. For example, CALFED expects to generate substantial water use efficiency incentives through improvements in the water market and through willing-seller water acquisitions for Ecosystem Restoration Program instream flows. In addition, improvements in water quality in the Water Quality Program can assist in meeting water use efficiency goals by reducing the need for water to meet soil leaching requirements and by enhancing water reclamation opportunities. Similarly, actions taken under the Water Use Efficiency Program are expected to have ancillary benefits for other CALFED objectives. Reducing unnecessary surface runoff from farms and urban areas can enhance water quality by reducing the discharge of unwanted substances into watercourses. In addition, WUE measures can improve water supply reliability by increasing the number of opportunities available to water managers. Finally, through the planning and implementation of WUE measures, the cost effectiveness of various storage components will become better defined.

Based on analysis provided in the Water Use Efficiency Program Plan, estimates of potential reduction of water application and irrecoverable losses are summarized in the following table. Values in the table represent potential reductions of water application and irrecoverable losses that are most likely to occur for future conditions regardless of the outcome of a CALFED solution (termed no-action) as well as the incremental savings expected from a CALFED solution. Representative values shown in this summary table are all midpoints in value ranges contained in the Revised Water Use Efficiency Program Plan.

The purpose of this table is to give the reader a perspective of the order of magnitude of the potential effects of water use efficiency improvements both with and without the CALFED solution. The values presented are not goals or targets. Rather, they are intended to provide the relative magnitude of potential results of expected efficiency actions. Because stakeholders disagree on the magnitude and/or the feasibility of achieving these values, the values will be further refined before the CALFED Programmatic EIS/EIR is finalized. Stakeholders do agree, however, that water conservation can provide significant benefits for multiple purposes and therefore is a significant contribution to the CALFED solution. Consistent with a programmatic

WORK IN PROGRESS 12/8/98

FOCUS GROUP WORKING DRAFT

Summary of Estimated Conservation and Recycling Potential (1,000 acre-feet)¹

(The Focus Group is still refining descriptive language in this table to ensure that the information is presented as clearly as possible.)

	No Action (in absence of CALFED)			CALFED Increment (result of CALFED actions)			Total Conservation Potential		
	Recovered Losses with Potential for Rerouting Flows (A=C-B) ³	Potential for Recovering Currently Irrecoverable Losses (B) ³	Total Potential Reduction of Application (C) ³	Recovered Losses with Potential for Rerouting Flows (A=C-B) ³	Potential for Recovering Currently Irrecoverable Losses (B) ³	Total Potential Reduction of Application (C) ³	Recovered Losses with Potential for Rerouting Flows (A=C-B) ³	Potential for Recovering Currently Irrecoverable Losses (B) ³	Total Potential Reduction of Application (C) ³
Urban (Total Delivered Water: [to be added later])	475	685	1,160	435	845	1,280	910	1,530	2,440
Agricultural (Total Applied Water: 25,719)	2,162	228	2,390	1,668	148	1,816	3,830	376	4,206
Urban Recycling ²	169	798	967	85	255	340	254	1,053	1,307
TOTAL	2,806	1,711	4,517	2,188	1,248	3,436	4,994	2,959	7,953

¹ All figures are forecast for year 2020 and are from CALFED's Revised Water Use Efficiency Program Plan.

² No Action urban recycling values do not include existing recycling level of 485,000 acre-feet (the March 1998 Phase II Interim Report inadvertently included the existing values).

³ The values in Column B (Potential For Recovering Irrecoverable Losses) and Column C (Total Potential Reduction of Application) were computed explicitly from regional values of applied water, depletion, evapotranspiration of applied water and other factors. The values in Column A (Recovered Losses with Potential for Rerouting Flows) were computed as the difference between the values in Columns B and C.

analysis, specific actions or programs that would have to be implemented to achieve these results have not been specified.

The table describes three types of potential reductions:

- Recovered Losses with Potential for Rerouting Flows - These losses currently return to the water system, either as groundwater recharge, river accretion, or direct reuse. Reduction in these losses would not increase the overall volume of

water, but might have other benefits such as making water available for irrigation or instream flows during dry periods, improving water quality, decreasing diversion impacts or improving flow between the point of diversion and the point of reentry.

- Potential Irrecoverable Losses - These losses currently flow to a salt sink, deep aquifer, or the atmosphere, and are unavailable for reuse. Reduction in these losses would increase the volume of useable water.
- Potential Reduction of Application - This is the sum of the previous reductions.

There appears to be emerging agreement between agricultural and environmental interests on distinctions between different types of potential reductions. This is a significant breakthrough in the debate over agricultural water conservation potential as it enables the CALFED program and stakeholders to focus on effectively reducing specific types of losses to obtain desired benefits.

With respect to urban and agricultural water conservation, CALFED proposes to rely largely on locally-directed processes to provide endorsement or certification of urban and agricultural water suppliers that are properly analyzing conservation measures and are implementing all measures that are cost-effective and feasible. Organizations composed of water suppliers and public interest or environmental groups already exist that may be able to serve this function. Endorsement or certification of water suppliers will enable CALFED agencies to target assistance programs and other measures to assure efficient water use.

The draft Water Use Efficiency Program includes the following actions.

Water conservation related actions include:

- Work with the California Urban Water Conservation Council and the Agricultural Water Management Council to identify appropriate urban and agricultural water conservation measures, set appropriate levels of effort, and to identify a proper entity to certify or endorse water suppliers that are implementing cost-effective feasible measures.
- Expand state and federal programs to provide sharply increased levels of planning, technical, and financing assistance and develop new ways of providing assistance in the most effective manner.
- Help urban water suppliers comply with the Urban Water Management Planning Act.
- Help water suppliers and water users identify and implement water management

measures that can yield multiple benefits including improved water quality and reduced ecosystem impacts.

- Identify and implement practices to improve water management on wildlife refuges.
- Gather better information on water use, identify opportunities to improve water use efficiency, and measure the effectiveness of conservation practices.
- Develop, in consultation with the Agricultural Water Management Council, a program of technical and financial incentives to achieve local-level implementation of water use efficiency measures in the agricultural sector.
- Identify, in region-specific Strategic Plans for Agricultural Areas, measurable objectives to assure improvements in water management.

Water recycling actions include:

- Help local and regional agencies comply with the water recycling provisions in the Urban Water Management Planning Act.
- Expand state and federal recycling programs in order to provide sharply increased levels of planning, technical, and financing assistance (both loans and grants), and develop new ways of providing assistance in the most effective manner.
- Provide regional planning assistance that can increase opportunities for use of recycled water.

Assurances will play a critical role in the Water Use Efficiency Program element. The assurance mechanisms are structured to ensure that urban and agricultural water users implement the appropriate efficiency measures. As a prerequisite to obtaining CALFED Program benefits (~~receiving "new" water, participating as a buyer or seller in a water transfer, receiving water from a drought water bank~~) (for example, participating as a buyer or seller in a water transfer, receiving water from a drought water bank, or receiving water made available solely because of supply enhancements such as new, expanded, or reoperated facilities) water suppliers will need to show that they are in compliance with the applicable urban or agricultural council agreements and applicable State law. This requirement will result in careful analysis and implementation of cost-effective conservation measures identified in those agreements.

A high level of water use efficiency is also expected to be required as a condition for permitting of any new surface storage projects. Widespread demonstration of efficient use by local water suppliers and irrigation districts will be a prerequisite to CALFED implementation of new

storage projects. Regulatory requirements and proposed compliance strategies are described more fully elsewhere in this document.

~~Some assurances of water use efficiency are yet to be refined or fully developed. There is little stakeholder consensus surrounding the role of the Agricultural Water Management Council (AWMC) as the entity to assure a high level of water use efficiency in the agricultural sector. A related issue concerns the way water deliveries are measured and priced: CALFED is considering a requirement that recipients of "new" or transferred water meet water measurement and volumetric pricing requirements developed under the Central Valley Project Improvement Act (CVPIA), but this would conflict with the policies of the AWMC. There is also uncertainty regarding assurances of water recycling. At the request of stakeholders, CALFED will explore incentives to encourage increased levels of water recycling.~~

~~Local water suppliers will rely on CALFED agencies to provide a high level of technical and financial assistance and planning assistance to support local conservation and recycling efforts. Adequate funding for assistance programs will be an important assurance for local agencies. Initial estimates suggest a need for \$30 million per year during Stage 1 implementation for CALFED agencies to carry out adequate assistance programs CALFED's Stage 1 cost estimate for state and federal financial assistance is \$700 million which may be increased as the program is further refined.~~

~~Economic analyses are underway that will compare water use efficiency options (including conservation, recycling, and transfers) and new facilities and identify least-cost ways of meeting CALFED objectives. These analyses are expected to better define the mix of demand management options and water supplies from new facilities. CALFED will work with stakeholders on technical and implementation issues as these analyses proceed.~~

~~The effectiveness of water use efficiency measures can be enhanced by other program actions. For example, the groundwater banking and conjunctive use programs in Delta export areas such as the San Joaquin Valley and the Tulare Lake Basin and in the Sacramento Valley could enable water users to bank conserved water for use in times of shortage. The extent of feasible water recycling is affected by efforts to maintain and improve water quality. Source water that is high in salinity may not be suitable for subsequent recycling.~~

Potential benefits of the water use efficiency program include:

- Reduces demand for Delta exports and reduces related entrainment effects on fisheries
- Can help in timing of diversions which can reduce entrainment effects on fisheries
- Could make water available for transfers to water users and for environmental

flows

- May improve overall Delta and tributary water quality
- Could reduce the total salt load to the San Joaquin Valley

More information on the water use efficiency program will be included in the revised *Water Use Efficiency Program Plan*.

[*need to insert paragraph on CALFED water measurement***]**

Development of Agricultural Water Use Efficiency Program. The March 1998 draft EIS/EIR proposed that an existing group, the Agricultural Water Management Council established pursuant to AB3616, play a pivotal role in assuring demonstration of efficient water use in the agricultural sector. Concerns about this proposal, and about the agricultural water use efficiency program more generally, led to the formation of both a formal stakeholder-agency focus group to evaluate and propose improvements to the program and a technical review panel to review the technical basis for the program and proposals included in the EIS/EIR. The Focus Group has met several times and its preliminary recommendations are reflected in this document. Before the CALFED Programmatic EIS/EIR is finalized, CALFED will incorporate comments received from these two groups, as well as other comments received from the public, and will proceed with program refinement in an open public process.

The ultimate goal for CALFED is to develop a set of agricultural water use efficiency programs and assurances that contributes to CALFED goals and objectives, has broad stakeholder acceptance, fosters efficient water use, and helps support a sustainable agricultural economy in the Central Valley. In doing so, CALFED must develop a program that:

- Promotes the use of water in a way that optimizes both on-farm and environmental (including water quality) benefits.
- Takes into account the regional differences in available water management options.
- Includes effective linkages to other CALFED programs.

The Focus Group is developing a program structured around four broad elements. These elements – listed below and enumerated in greater detail in the accompanying section on action steps – are mutually supporting and are presented as a package.

- **Incentives** - Develop, in consultation with the Agricultural Water Management Council, a program of technical and financial incentives for the implementation of

water use efficiency measures in the agricultural sector. The financial incentives should generally take the form of loans for actions or activities that have been identified as cost-effective for the district in a water management plan approved by the Agricultural Water Management Council. The financial incentives should generally take the form of incentive grants for water use efficiency measures that are supplemental to measures that are cost-effective at the district level.

A locally tailored program that incorporates the work of AB3616.

Measurable objectives - Measurable objectives are objectives for improvements in water management, which can be measured or otherwise tracked to assure that such improvements occur. Objectives will include outcome indicators based on actual water use. Objectives must result in reduced demand on Bay-Delta systems, in increased water quantity or improved timing of instream flow or other specific CALFED objectives.

Assurances - Assurances will play a critical role in the Water Use Efficiency Program element. The assurance mechanisms are structured to ensure that urban, agricultural, and refuge water users implement the appropriate efficiency measures.

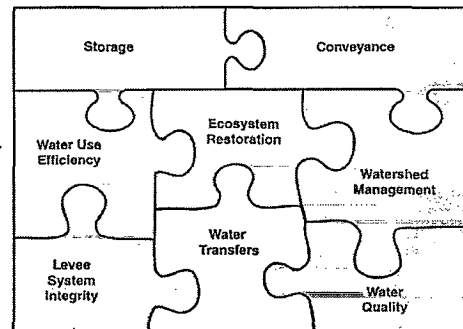
Before finalizing the CALFED Program, CALFED will develop a Strategic Plan for Agricultural Water Use Efficiency. The purpose of the Plan will be to articulate a prioritized, strategic, aggressive program for the achievement of efficient water management for all purposes throughout the many different agricultural regions of the state. The plan will focus in detail on specified regions, basins, and districts on a prioritized basis. The plan will draw on the work of local agencies and other sources to assess:

- What efficient practices are already being carried out
- Identify additional opportunities for improved water management
- Recommend goals
- Recommend incentives and other means to overcome any barriers to adoption of more efficient water management practices

The Strategic Plan is to be developed by the end of 1999. A facilitated process for such development, including non-agency stakeholders, will be undertaken.

Water Transfer Program

Water transfers are currently an important part of water management in California and offer the potential to play an even more significant role in the future. Transfers can provide an effective means of moving water between users on a voluntary and compensated basis, as well as a means of providing incentives for water users to implement management practices which will improve the effectiveness of local water management.



Every year, hundreds of thousands of acre-feet of water are transferred between willing parties. Most of these transfers consist of in-basin exchanges or sales of water among Central Valley Project (CVP) or State Water Project (SWP) contractors. For example, in 1997 nearly 288,000 acre-feet of CVP water was transferred by CVP contractors south of the Delta. ~~Of this amount, approximately 76,000 acre-feet was transferred to meet the San Joaquin Valley Level IV refuge water needs, as required by CVPIA.~~ Since 1993, over 1.4 million acre-feet of CVP water has been transferred north and south of the Delta by contractors within the various divisions of the CVP. In addition, approximately 230,000 acre-feet of non-CVP water has been purchased and transferred by the Interior Water Acquisition Program to meet established instream flow purposes.

Generally, past transfers have been successful, and CALFED actions must not interfere with the historical ability to transfer water. ~~but they~~ Some transfers have raised concerns regarding adverse impacts to other water users, to rural community economies and to the environment. They have also highlighted contradictory interpretations of state law, the lack of reliable ways to transport the transferred water across the Delta, and complicated approval processes. Before the value of water transfers as a management tool can be fully realized, these problems need to be addressed.

The Water Transfer Program proposes a framework of actions, policies, and processes that, collectively, will facilitate water transfers and further development of a statewide water transfer market by addressing these problems. Because water transfers can impact third parties (those not directly involved in the transaction) and/or local groundwater, environmental, or other resource conditions, the framework also includes mechanisms to provide protection from such impacts.

Both the BDAC Water Transfer Work Group and the Transfer Agency Group were instrumental in identifying the issues which constrain the water transfer market. These were sorted into three broad categories to aid in developing resolution:

1. *Environmental, socio-economic, and water resource protections* - including:
 - Third party socio-economic impacts

- Groundwater resource protection
 - Transfers to augment instream flow
 - Environmental protection in source areas
 - Area of origin/watershed priorities
 - Rules/guidelines for environmental water transfers
2. *Technical, operational, and administrative rules* - including:
- Transferrable water and the "no injury rule"
 - Saved or conserved water
 - Operating criteria and/or carriage water requirements
 - Reservoir refill criteria
 - Streamlining the transfer approval process
3. *Wheeling and access to state/federal facilities (especially for cross-Delta transfers)* - including:
- ~~Reliability~~ Predictability of access for transferred water in existing state and federal project facilities
 - Priority of transferred water in new facilities
 - Wheeling costs

The Water Transfer Program recommends the following actions, policies, and processes as a framework for solutions to these constraints. Being programmatic in nature, it describes these only in enough detail to convey the direction and general purpose of each. More detail will be added to the framework between this public draft and a finalized Programmatic EIR/EIS. ~~Some~~ Additional detail will ~~necessarily occur~~ be developed during the months and years after the Programmatic EIR/EIS is finalized. During the next several months, the BDAC Water Transfer Work Group and the Transfer Agency Group will continue to work together to develop these solutions.

- **Establish the California Water Transfers Information Clearinghouse** to ensure that decisions regarding proposed water transfers can be made with all parties in possession of complete and accurate information and to provide information to facilitate assessment of potential third party impacts. The Clearinghouse would not function as a market broker, nor would the Clearinghouse operate as a water bank as a regulator, a market broker, nor as a water bank. The Clearinghouse would:
 - collect and disseminate data and information relating to water transfers and potential transfer impacts
 - perform research using historic data to understand water transfer impacts
 - provide a forum for discussion and comment on proposed transfers

- **Coordination among CALFED agencies to formulate policy**, under their existing authorities, for required water transfer analysis. This would require all transfer proposals which are subject to approval by the SWRCB or that depend on access to state/federal conveyance facilities to include information regarding potential socio-economic, groundwater, and cumulative impacts at the time of submission for approval by the respective CALFED agency. It is anticipated that the required analysis would differ according to the category of proposed transfer (short term/long term, in basin/out of basin, large/small, etc.). Information would be provided by the transfer proponents. This is for public information purposes and would be disclosed through the California Water Transfers Information Clearinghouse.
- **Development by CALFED agencies of a standardized checklist and analysis procedure** to be followed for each proposed water transfer that undergoes review by the SWRCB, DWR or USBR. This would guide transfer proponents through a series of questions, requesting specific information regarding the proposed transfer. This checklist would allow the proponents to prepare all the necessary information prior to submitting it to the SWRCB or other approving agency, greatly reducing the time spent trying to fill information gaps that often remain under the existing transfer approval process. This procedure should be consistent with an overall effort to streamline the transfer approval process, at least in those categories of transfers that generally have not caused appreciable concerns.
- **Forecast and disclosure by DWR and USBR of potential conveyance capacity** to provide transfer proponents more timely information regarding the potential availability of conveyance capacity for cross-Delta water transfers and probabilities of it being available. Forecasts would occur on a monthly basis (in conjunction with water supply forecasts). Forecasts would also be provided for other portions of project conveyance facilities, as needed. Forecasts would be based on the best information available to project operators, but could not guarantee that the capacity would be available because of the numerous operating variables, including but not limited to: hydrologic conditions, ESA requirements, Delta water quality standards, and physical capacity limitations.
- **A process for CALFED agencies to work with stakeholder representatives to ~~reduce the conflict between transfer proponents and the SWRCB, DWR, or USBR regarding~~ clarify and define what water is deemed transferrable under what conditions.** The objective of this process will be to ~~define~~ develop a standardized set of rules on transferable water. Clarification of the CALFED agencies' criteria for quantifying transferrable water, including potential variations in the accepted criteria for time or location (i.e., one-year transfers versus multi-year and in-basin versus out-of-basin) is a key outcome. The initial focus of this process would be

technically based, resulting in a set of differing water transfer scenarios and accompanying definitions. Results of this effort may include formal rules adopted by the SWRCB during the initial years of CALFED's Stage 1 implementation. The details of this process, including the specific objectives, and the identification of stakeholder representatives, have not been determined.

- **A process for CALFED agencies to work with stakeholder representatives to resolve conflicts over reservoir refill and carriage water criteria.** This effort will focus on ~~ensuring that neither water transfers~~ clarifying agency policies and ~~rules governing water transfers that involving~~ involve releases from stored water ~~nor~~ the transport of water across the Delta ~~cause adverse impacts to other legal users of water~~. CALFED agencies may adopt a policy that requires proposed water transfers from storage to include a reservoir refill analysis identifying potential impacts to other legal users of water, and to identify appropriate mitigation measures. Carriage water is defined as the additional water that may be necessary to accompany a cross-Delta water transfer to maintain water quality or other standards imposed on Delta export operations. Clarifying carriage water criteria may be resolved with a longer term process that relates closely to other operational changes being proposed for Delta water management since they can impact the necessity for carriage water.

- ~~**A process for CALFED agencies to work with stakeholder representatives to develop methodology to monitor instream transfers**~~ and associated tracking measures. This process is designed to ensure that water transferred to the environment is available to meet its stated instream purpose throughout its designated reach. The process will also address opportunities for those buying water for instream purposes to make it available for re-diversion (resale) at given points downstream, if so desired. More specific actions and policies will likely be developed through this process prior to release of the final Programmatic EIR/EIS.

A process for CALFED agencies to work with stakeholder representatives to develop appropriate protection provisions for water transferred for instream uses. This will include (a) developing methodology for monitoring instream transfers and associated tracking measures, (b) developing appropriate implementation procedures or regulations for Cal. Water Code Section 1707 transfers, and [c] evaluation as to whether additional statutory or regulatory protection of water transfers for instream purposes is necessary. This process is designed to ensure that water transferred to the environment is available to meet its stated instream purpose throughout its designated reach. This process should provide mechanisms for assuring that water transferred for instream use be supplementary to water used to meet regulatory requirements, unless otherwise

explicitly provided by the terms of the transfer. The intended provisions should also clarify the circumstances under which water transferred for instream use may be subsequently diverted for other purposes downstream.

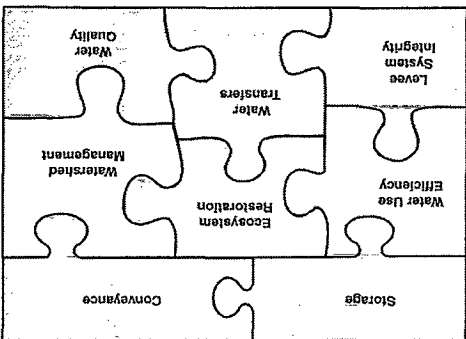
- A process for CALFED agencies to work with stakeholder representatives to develop potential procedures for transporting transferred water through existing water conveyance facilities. The purpose is to develop criteria and procedures governing the determination of transport system availability. Such criteria and procedures would include how to process requests for use of a system, and how to calculate the unused capacity.
- A process for CALFED agencies to work with stakeholder representatives to discuss costs develop cost criteria associated with transporting transferred water through state or federal conveyance facilities. This process will result in an agreed upon set of criteria governing the determination of transport costs such that transfer proponents can factor such costs into transfer proposals early in development phase of a potential water transfer deal. More specific actions and policies will likely be developed through this process prior to release of the final Programmatic EIR/EIS.
- A process for CALFED agencies to work with the Legislature and stakeholders to discuss whether additional legislation to protect water rights, including area of origin priorities, is necessary.
- A process for CALFED agencies, in consultation with the stakeholders, to identify and develop interim rules, regulations or procedures necessary for an effective water transfer market pending long term resolution of definitional and procedural issues identified above.
- A process for CALFED agencies to work with stakeholders, the Legislature, and local agencies to identify appropriate assistance to enable local agencies to develop and implement groundwater management programs to protect groundwater basins in water transfer source areas.

Once a final CALFED Bay-Delta Program Programmatic EIR/EIS is certified, implementation of these recommendations will begin. However, the processes described above (48 of the 812 bulleted items above) will be developed and in some cases instituted during 1999, before the Programmatic EIR/EIS is finalized. Where resolution on issues can be reached through these processes, resulting recommended solution options will be integrated into the final programmatic description and become part of the implementation plan. For the issues which cannot be satisfactorily resolved, the processes themselves would become part of the implementation plan contained in a certified Final Programmatic EIR/EIS.

More information on the water transfer program will be included in the revised *Water Transfer Program Plan*.

Watershed Program

The two main components of the Watershed Program are to provide assistance - both financial and technical - to local watershed programs, and to aid in the coordination and integration of local watershed programs with the CALFED Program. The Watershed Program supports and encourages locally-led watershed activities that benefit the Bay-Delta system. Realizing that watershed approaches may vary, a set of guiding principles has been established. These guiding principles illustrate a "bottom-up" approach rather than "top-down." Emphasis is placed on the importance of community involvement and support. In addition, Emphasis is placed on a "bottom up" approach rather than "top down," recognizing that local watershed approaches may vary and that community involvement and support are essential. The Watershed Program strives to strengthen the partnerships and relationships between the public, local watershed organizations, and governments at all levels. Like the CALFED Bay-Delta Program itself, watershed activities included in the Watershed Program should ensure that adaptive management processes can be applied at multiple scales and across ownerships.



In summary, the draft Watershed Program includes the following elements:

- **Support Local Watershed Activities**

- Implement watershed restoration, maintenance, and conservation activities that support the goals and objectives of CALFED.

- **Coordination and Assistance** - Facilitate and improve coordination and assistance between government agencies, other organizations, and local watershed groups.
- **Watershed Monitoring Assessment** - Facilitate monitoring efforts that are

WATERSHED PROGRAM GOAL

To help coordinate and integrate existing and future local watershed programs and to provide technical assistance and funding for watershed activities and protection relevant to achieving the goals and objectives of the CALFED Bay-Delta Program.

consistent with CMARP's protocols and support watershed activities that ensure adaptive management processes can be applied.

- **Education and Outreach** - Support resource conservation education at the local watershed level and provide baseline support to watershed programs.
- **Watershed Processes and Relationships** - Identify the watershed functions and processes that are relevant to the CALFED goals and objectives, and provide examples of watershed activities that could improve these functions and processes.
- **Integration with Other Common Programs** - Improve the integration of the Common Programs, especially the efforts of the Watershed Program with the actions implemented under the Ecosystem Restoration and Water Quality programs.

~~Within the various Program elements, CALFED had originally proposed hundreds of programmatic actions in the "lower" watershed; however, relatively few actions were proposed in the "upper" watershed. These circumstances were a significant factor in the decision to elevate the watershed element to a Common Program status. The Watershed Program was developed to compensate for this imbalance by including actions in both the upper and lower watershed. Furthermore, the Watershed Program has not established watershed boundaries, but will include those watershed activities that demonstrate benefits to the Bay-Delta system. Consistent with the emerging direction of the Watershed Program, CALFED's ongoing Restoration Coordination Program has provided funding to conduct numerous watershed based projects. The following funded watershed projects are good examples of the approach the Watershed Program will use to help meet the broad goals and objectives of the CALFED Bay-Delta Program:~~

- ~~Alhambra Creek Coordinated Resource Management Plan~~
- ~~American River Integrated Watershed Stewardship Strategy~~
- ~~Sand & Salt Creeks Watershed Project~~
- ~~Sacramento River "Headwaters to the Ocean, Public Information and Education Program."~~

~~Discussions with stakeholders and watershed groups have noted the merits of developing a state-wide statute encouraging watershed management efforts. Although all parties emphasize the need for watershed efforts to be driven at the local level, an umbrella statute providing broad guidance and targetting appropriate financial assistance may be desirable. CALFED will work with stakeholders and the Legislature to pursue this option.~~

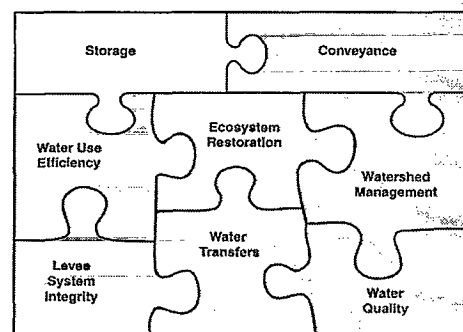
The following are examples of watershed activities that can make improvements in each of the four CALFED problem areas:

- **Ecosystem Quality** - Watershed activities that improve riparian habitat along streams, increase or improve fisheries habitat and passage, restore wetlands, or restore the natural stream morphology affecting downstream flows or species may benefit ecosystem quality.
- **Water Quality** - Watershed activities may benefit water quality in the Bay-Delta system by helping to identify and control non-point sources of pollution, and identify and implement methods to control or treat contaminants. Watershed activities which reduce the pollutant loads in streams, lakes, or reservoirs could measurably improve downstream water quality.
- **Water Supply Reliability** - ~~Meadows and riparian corridors in the upper watershed tend to slow the rate of runoff and allow more percolation of water into aquifers. When meadows erode and riparian corridors are degraded, runoff during storms can occur at higher rates. This process makes flood management more difficult and reduces the opportunities to capture runoff in downstream reservoirs. Watershed activities designed to restore meadows and riparian corridors can attenuate the peak flows that occur during storms and allow more of this water to be absorbed into aquifers of the upper watershed. This water can contribute to increased stream base flow later in the season which improves water supply reliability and provides environmental benefits for fish and wildlife. As land use activities within a watershed intensify, the ability of that watershed to slow runoff and allow water to percolate into aquifers tends to decrease. One result of this modified condition can be increased surface runoff and higher peak flows during storms. This condition can make flood management more difficult, and reduce opportunities to capture runoff in downstream reservoirs. Activities designed to restore or enhance the ability of watersheds to absorb, store, and release water can reduce peak flows during storms and extend stream base flows through the dry season. The benefits of these activities include reduced flood risks, increased water supply reliability, and improved habitat conditions for fish and wildlife.~~
- **Levee and Channel Integrity** - Attenuation of flood flows coming from the upper watershed can provide benefits far downstream in the system. Delta levees are most vulnerable during high winter flows; watershed activities which reduce these flows can help maintain the integrity of the levees.

More information on the watershed program will be included in the revised *Watershed Program Plan*.

Storage

Storage of water in surface reservoirs or groundwater basins can provide opportunities to improve the timing and availability of water for all uses. The benefits and impacts of surface and groundwater storage vary depending on the location, size, operational policies, and linkage to other Program elements. By storing during times of high flow and low environmental impact, more water is available for release for environmental and consumptive purposes during dry periods when conflicts over water supplies are critical. Properly managed, storage turns low value water into high value water for all uses.



Both groundwater and surface storage provide additional flexibility for managing water supplies, but there are differences in the potential operation of these two approaches to storage. Groundwater storage is generally viewed as having more benign on-site impacts to both environmental and other existing uses of the land. Depending on its operation, groundwater storage can also have significant water quality benefits. Finally, groundwater storage is generally less expensive than new surface storage facilities. On the other hand, surface storage can have flood control, power generation and regulation, and recreational benefits not generally available with groundwater storage. More importantly, surface storage is more suited to rapidly discharging or receiving large volumes of water, a distinct advantage in real-time management of high river flow periods or environmental storage releases.

Considering the magnitude of conflicts over available water in California, CALFED believes that it must aggressively evaluate and implement all available water management options to ensure water supply reliability. Therefore, aggressive implementation of water conservation, recycling, and a protective water transfer market are critically important for effective water management. New surface and groundwater storage will be constructed as necessary, considering appropriate implementation of nonstructural programs and demonstrated willingness to pay by potential beneficiaries, to meet CALFED's program goals. During Stage 1, CALFED will evaluate and determine the appropriate mix of these water management tools.

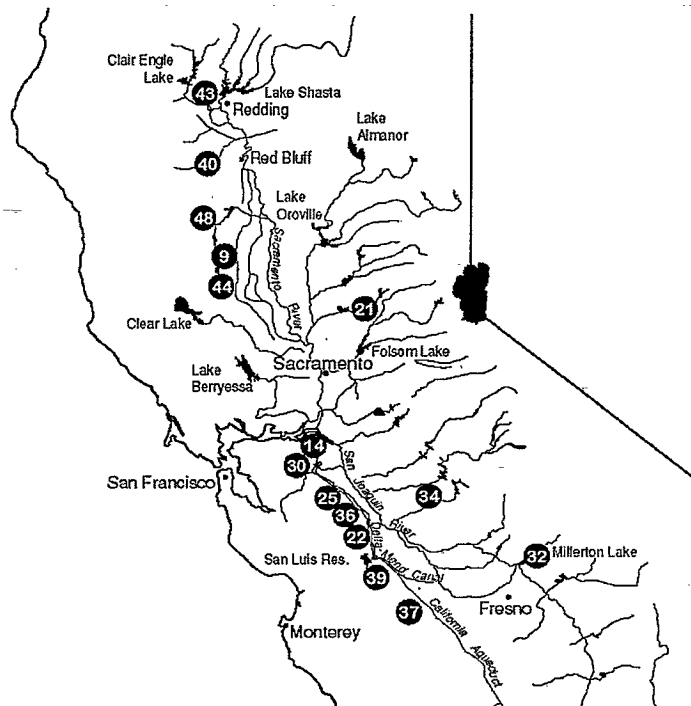
Based on a programmatic evaluation of potential water supply benefits and practical consideration of acceptable levels of impacts and total costs, the range of total new storage considered for evaluation in Phase II was from zero up to about 6 MAF. This amount of new storage was considered a reasonable range for study purposes and impact analysis; more detailed study and significant interaction with stakeholders will be required before specific locations and sizes of new storage are proposed. However, most water supply benefits of Sacramento River off-stream storage are achieved with about 3 MAF of storage, while most water supply benefits of south of Delta off-aqueduct storage are attained with about 2 MAF of storage.

Other types of surface storage considered in Phase II include San Joaquin River tributary storage

and in-Delta storage. Relatively smaller volumes of storage are practical for these types of storage facilities due to engineering considerations. Groundwater banking and conjunctive use in the Sacramento and San Joaquin Valleys were also considered in Phase II. The practical storage capacity available for groundwater storage in these areas will be determined only after detailed study of specific projects and full consideration of local concerns. For study purposes, groundwater storage volumes of 250 TAF in the Sacramento Valley and 500 TAF in the San Joaquin Valley were considered. Although significant additional work needs to be completed to identify groundwater storage opportunities, possible sites include Stockton East, an expanded Kern Water Bank, and the Madera Ranch project. In addition, there may be significant opportunities for enhanced surface and groundwater storage within service areas dependent on Delta water for some or all of their supplies.

CALFED will focus on off-stream reservoir sites for new surface storage, but will consider expansion of existing on-stream reservoirs. CALFED will not pursue storage at new on-stream reservoir sites. Under the ecosystem restoration program element, some dams and stream obstructions will be removed to open additional areas of fishery habitat. Even with new dams for surface storage, there will be fewer stream miles blocked in California with implementation of the CALFED Bay-Delta Program.

For the purposes of the programmatic Phase II evaluation, an inventory of fifty-two potential new surface storage projects was compiled. Those projects that appeared most feasible (see adjacent figure) were evaluated to provide representative information on costs and benefits. A more complete screening process for surface storage opportunities, taking into account engineering feasibility, potential environmental impacts, costs, and benefits, will proceed over the coming months and will be documented in a future report. While screening remains to be completed, among possible locations for additional surface storage are Sites Reservoir, a modestly enlarged Shasta Reservoir, and in-Delta storage. CALFED has narrowed the number of potential sites for additional CALFED consideration to the fifteen in the following table. These include potential sites to provide benefits for water supply, flood control, water quality, ecosystem, and other multiple purposes.



Reservoir Sites Retained for Additional CALFED Consideration (Retained for Future Evaluation and Screening)			
Project	Location	Type	Gross Storage Capacity
Colusa Reservoir Complex (Site 9)	Colusa/Glenn Counties Funks Creek	Off-Stream Storage	3,300 TAF
Garden Bar Reservoir (Site 21)	Sutter County Bear River	On-Stream Storage	245 TAF
Garzas Reservoir (Site 22)	Stanislaus County Garzas Creek	Off-Stream Storage	139 to 1,754 TAF
In-Delta Storage (Site 14)	Sacramento/San Joaquin Delta	Island Storage in the Delta	230 TAF
Ingram Canyon (Site 25)	Stanislaus County Ingram Creek	Off-Stream Storage	333 to 1,201 TAF
Los Vaqueros Enlargement (Site 30)	Contra Costa County Kellogg Creek	Off-Stream Storage	Additional 965 TAF
Millerton Lake Enlargement (Site 32)	Fresno County San Joaquin River	On-Stream Storage	Additional 720 TAF
Montgomery Reservoir (Site 34)	Stanislaus County Dry Creek	Off-Stream Storage	240 TAF
Orestimba Reservoir (Site 36)	Stanislaus County Orestimba Creek	Off-Stream Storage	380 to 1,140 TAF
Panoche Reservoir (Site 37)	Fresno County Silver Creek	Off-Stream Storage	160 to 3,100 TAF
Quinto Creek Reservoir (Site 39)	Merced/Stanislaus County Quinto Creek	Off-Stream Storage	332 to 381 TAF
Red Bank Project (Dippingvat-Schoenfield Project) (Site 40)	Tehama County S.F. Cottonwood Creek	Off-Stream Storage - Schoenfield Reservoir; On-Stream Storage - Dippingvat Reservoir	Schoenfield-250 TAF Dippingvat- up to 104 TAF
Shasta Lake Enlargement (6.5-foot raise of existing dam) (Site 43)	Shasta County Sacramento River	On-Stream Storage	Additional 290 TAF
Sites Reservoir (Site 44)	Colusa and Glenn Counties Funks & Stone Corral Cks	Off-Stream Storage	1,200 to 1,900 TAF
Thomes-Newville Reservoir (Site 48)	Glenn County Thomes & Stoney Creek	Off-Stream Storage	1,840 - 3,080 TAF

Of course, the relationship of water supply benefits to groundwater and surface storage volume is highly dependent on operating assumptions. Much more detailed information about specific locations of new storage, potential allocation of storage benefits, and operational goals and constraints would be necessary to determine an optimal volume of storage from a water supply

perspective.

A fundamental principle of the CALFED Program is that the costs of a program should be borne by those who benefit from the program. That principle is especially relevant in the decision about new storage facilities. In principle, public money will be used to finance storage projects only to the extent that the storage creates public benefits; user money should be used to finance the portion of storage that generates user benefits. This "user pays" principle is critical to the overall CALFED goal of increasing the efficiency of water use in California. CALFED is performing economic analyses evaluating new facilities and other approaches (such as conservation, recycling, and transfers) to identify cost-effective pathways to meeting CALFED objectives. These economic analyses will be especially useful in assisting all potential users of new storage to evaluate the relative costs and benefits of particular storage options, as well as other ways of addressing reliability.

The following linkages and conditions will guide development of groundwater/conjunctive use and new surface water storage. Agency and stakeholder input is needed to make the linkages and conditions for new storage more specific, and to develop appropriate "bundels" of actions so that all CALFED goals progress together.

Groundwater/conjunctive use programs. Groundwater/conjunctive use programs will be constructed as necessary to meet CALFED's goals provided:

- a. Groundwater monitoring, and modeling programs are established
- b. Complete all environmental documentation and permitting requirements
- c. Demonstrated commitment to finance by beneficiaries
- d. Full recognition is given to the rights of landowners
- e. Guidelines are in place to protect resources, address local concerns, and avoid potential impacts prior to and during implementing implementation of a conjunctive management operation. The draft guidelines developed to date include address the following:
 - Funding support ~~will be provided~~ for local assessment of groundwater resources.
 - Conjunctive management programs will be voluntary.
 - The needs of landowners and users of local groundwater are protected.
 - Conjunctive management projects will be overseen by local agencies in partnership with other entities to assure that concerns are addressed through interest-based negotiation.
 - Groundwater withdrawals must be managed to avoid land subsidence ~~and~~, aquifer degradation, and ecosystem degradation.
 - Consistency with local groundwater plans (such as AB3030 Plans) and City and/or County Comprehensive General Plans

Surface Storage. New or expanded surface storage will be constructed as necessary to meet CALFED's goals in conjunction with the following actions (all actions will be bundled so they move forward together):

- a. A high level of water use efficiency is achieved throughout the solution area.
- b. Demonstrated progress on the water transfer framework
- c. Demonstrated commitment to finance by beneficiaries
- d. Complete all environmental documentation and permitting requirements including completion of site specific Clean Water Act Section 404 compliance

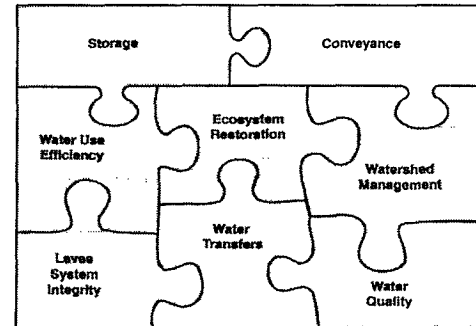
CALFED seeks to plan for recreation enhancement and, if necessary, to mitigate impacts to Delta recreation resulting from CALFED activities designed to restore other Delta resources. Construction of new facilities will provide for appropriate on-site recreation development. The responsibilities and procedures for recreation development at new storage and other facilities is clearly addressed in current law. Federal and state laws and local laws and plans govern recreation developments associated with water development projects in and near the Delta. The Draft Programmatic EIS/EIR and accompanying technical reports address general impacts that CALFED Program implementation could have on recreational resources and on how the recreational resources could impact the other parts of the Program. The time line of such a process should be consistent with the Phase III documentation and implementation schedule, ensuring that recreation resources are appropriately considered as part of the Bay-Delta solution.

The CALFED Program has no specific objectives for hydropower generation. However, CALFED does seek to minimize negative impacts on resources, such as hydropower generation, during and after implementation. The Program may result in temporary or long-term changes in river and reservoir operations, which may affect the quantity, timing and value of hydropower produced within the Bay-Delta system. Also, additional pumping may increase the amount of Project Energy Use (power consumed by the CVP and the SWP to move water through the system). An increase in Project Energy Use can reduce the amount of surplus hydropower that might otherwise be available for sale from the CVP (necessary to repay Project debt), and may increase the amount of power that must be purchased from outside sources to meet SWP Project Energy Use. Replacement for reduced availability of renewable hydropower would likely come from fossil fuel or other thermal generation. CALFED is coordinating with the Western Area Power Administration to assure that issues are identified and properly framed, so consequences and options are clear to stakeholders, the public, and the CALFED decision-makers.

Conveyance

Introduction

The Delta conveyance element of the Program describes the various configurations of Delta channels for moving water through the Delta and to the major export facilities in the southern Delta. While there are countless combinations of potential modifications to Delta channels, three primary categories of Delta configuration options, as described below, were studied in Phase II of the Program. These Delta conveyance options were the primary distinguishing features among the three broad categories of alternatives studied in Phase II.



Because of the potential impact on flow patterns and Delta water quality, the Delta conveyance configuration of an alternative can greatly affect the performance of other Bay-Delta program elements. The three primary Delta conveyance configurations evaluated in Phase II of the program are:

Existing System Conveyance. The Delta channels would be maintained essentially in their current configuration. One significant variation would include some selected channel improvements in the southern Delta together with flow and stage barriers at selected locations to allow for increasing the permitted pumping rate at the SWP export facility to full existing physical capacity of 10,300 cfs. These physical changes in the existing system include many of the features contained in the proposed Interim South Delta Project. Other variations that address the same needs are also being evaluated.

Modified Through Delta Conveyance. Significant improvements to northern Delta channels would accompany the southern Delta improvements contemplated under the existing system conveyance alternative. Variations include a wide variety of channel configurations, designed to improve flow patterns to benefit fisheries throughout the Delta, provide flood control, and improve water quality in many parts of the Delta.

Dual Delta Conveyance. The dual Delta conveyance alternative is formed around a combination of modified Delta channels and a new canal or pipeline connecting the Sacramento River in the northern Delta to the SWP and CVP export facilities in the southern Delta. Capacities for this new isolated conveyance facility in the range of 5,000 cfs to 15,000 cfs were evaluated in Phase II of the Program. The new facility would siphon under all major waterways to minimize aquatic impacts.

~~Not all of the Delta waterways follow natural channels~~Strategy

The CALFED strategy regarding conveyance must consider water quality for in-Delta uses, drinking water quality, and fisheries. Some were constructed for navigation which is an important Delta function. These factors are critical to conveyance decisions both now and in the future as part of adaptive management. In addition to periodic navigational work on many Delta waterways, the U.S. Army Corps of Engineers built and maintains two commercial shipping channels through the Delta. The ports of Stockton and Sacramento are served by the Stockton Deep Water Ship Channel, completed in 1933, and the Sacramento Deep Water Ship Channel, completed in 1963. Most of the length of these channels have since been deepened to 35 feet. It is possible that changes in flow patterns may result in changed operation and maintenance requirements of the channels. The existing Delta channels will be an integral part of any CALFED decision for Delta conveyance. The reliance on these channels provides a shared interest in restoring, maintaining, and protecting Delta resources, including water supplies, water quality, levees, natural habitat, and the common Delta Pool, which also protects in-Delta agricultural uses. Some modifications to these through Delta channels can improve all of these Delta resources. Regardless of choices that may be made in the future, it makes sense to invest in these modifications to maximize chances that CALFED can meet the Program's purpose.

CALFED's basic strategy is to develop a through-Delta through-Delta conveyance alternative based on the existing Delta configuration with some modifications, evaluate its effectiveness, and add additional conveyance actions if necessary to achieve CALFED goals and objectives. The initial through-Delta conveyance will be continually monitored, analyzed, and improved to maximize the potential of the through-Delta approach meeting CALFED goals and objectives, consistent with its Solution Principles. This strategy focuses on making If the through-Delta conveyance achieves through-Delta conveyance still fails to meet the CALFED purposes. Details of conveyance improvements goals and objectives, there will undergo subsequent environmental analysis, but are expected to be a similar to the following: reassessment of the reasons and the need for additional Delta conveyance and water management actions.

If CALFED's goals and objectives cannot be accomplished by the through Delta conveyance strategy, the preferred program alternative includes additional actions that may be taken toward these goals and objectives after thorough assessment of a variety of factors. For example, a decision to construct an isolated facility may occur if, in combination with vigorous implementation of relevant common program elements and improvements to through Delta conveyance, and consideration of other water management options, an isolated conveyance facility is still deemed necessary. Such a facility would have to be demonstrated to be the most cost effective and least environmentally damaging alternative, and to be necessary for significantly advancing CALFED's commitment to seek continuous water quality improvement (as stated on page ____).

An isolated conveyance facility also may be necessary if there is inability to achieve fishery recovery due to continuing impacts of diversions from the south Delta. A combination of these

two factors also could result in construction of an isolated facility and/or other additional water management actions to meet CALFED goals and objectives after assessment of the effectiveness of the initial through Delta conveyance actions, and after a determination that such a facility would be effective in resolving these problems. These factors will be continually reevaluated during Stage 1 as part of the adaptive management process, and will form the basis for a comprehensive set of additional improvements in Stage 2.

Details of initial conveyance improvements will undergo subsequent environmental analysis before being implemented, but are expected to be similar to the following:

[*** List is being revised ***]

- South Delta channels would remain in their existing configuration except that Old River would be enlarged in the reach north of Clifton Court to reduce channel velocities and associated scouring.
- A new 2,500 cfs at 0.2 fps through-screen velocity (5,000 cfs at 0.4 fps through-screen velocity) fish screen would be constructed for the Tracy Pumping Plant.
- A new 6,000 cfs at 0.2 fps through-screen velocity (12,000 cfs at 0.4 fps through-screen velocity) screened intake with low lift pumps would be constructed at the head of Clifton Court and the SWP and CVP would be connected to aid flexible operations.
- An operable fish control barrier would be constructed at the head of Old River. Operable flow control barriers or their equivalent would be constructed in south Delta channels to alleviate the problem with reduced water levels and water quality problems that would be caused by the fish control barrier and export operations.
- A new Hood diversion test facility (with fish ladder or equivalent for upstream migrating fish) on the Sacramento River capable of diverting up to 2,000 cfs from the Sacramento River to the Mokelumne River would be constructed to determine whether adequate screening can be accomplished.
- North Delta channels along the Mokelumne River from Interstate 5 to the San Joaquin River would be enlarged by setback levees and dredging.

In addition, the initial CALFED Program will include:

- San Joaquin River and Delta water quality improvement actions described in the

Stage 1 action list and in more detail in the Water Quality Program Plan would be implemented.

- Source control measures for drinking water quality, including aqueduct watershed management measures, as described in the Stage 1 action list and in more detail in the Water Quality Program Plan would be implemented.
- Ecosystem Restoration measures for fishery improvement as described in the Stage 1 action list and in more detail in the Ecosystem Restoration Program Plan (including DEFT actions) would be implemented.

~~Modifications~~In fulfilling its commitment to the through Delta conveyance strategy an open, public decision making process, the following procedure will be only made after thorough assessment of a variety of factors used to evaluate progress towards the CALFED water quality goals and objectives during Stage 1 and to determine whether different conveyance actions should be carried out at the end of Stage 1 in order to meet public health and/or species recovery needs:

~~For example, a decision to construct an isolated facility will be warranted if, after aggressive implementation of relevant common program elements and improvements to through Delta conveyance, there is still a public health necessity for improved drinking water at the source (e.g., bromide levels) arising from technical or economic infeasibility of providing safe drinking water through other methods, and/or there is inability to achieve fishery recovery with continuing impacts of diversions from the south Delta. A combination of these two factors could also result in a decision for an isolated facility and/or other additional actions to meet CALFED goals. These factors will be continually reevaluated during Stage 1 as part of the adaptive management process, and will form the basis for a comprehensive set of additional improvements in Stage 2. Such reevaluation could be assisted by panels of recognized technical experts that would consider all of the relevant information and, in conjunction with stakeholder input, make recommendations to the appropriate decision making body.~~

- Establish a Delta Drinking Water Council comprised of independent, nationally recognized scientists and provide funding sufficient for the work to be adequately completed. The Legislature and stakeholders would be involved in selecting Council members. The ability of CALFED to provide recommendations to the Legislature would be dependent on having adequately implemented necessary information collection processes and having had adequate resources for accomplishing a thorough program review as the basis for the recommendations to the Legislature.
- With the support of CALFED staff, the Council will collect information as needed, including monitoring data from CMARP, health effects research results,

status of water quality standards development, treatment technology improvements, and cost comparisons. This information would be used by the Council to perform a broad-based evaluation of the performance of the through-Delta facility with regard to providing safe drinking water to consumers, taking into account findings of recent health effects studies, regulatory developments, and ongoing developments in treatment technology.

- The Council will prepare annual reports, to be submitted, along with reports from the Ecosystem Restoration Program Science Review Panel (see below) to CALFED and the Legislature, that document progress towards Stage 1 water quality goals.
- Using the reports of the Drinking Water Council and the Science Review Panel, CALFED will, with stakeholder involvement, conduct program reviews in 2003 and 2007 to assess whether Stage 1 actions to meet CALFED water quality, ecosystem, levee, and water supply reliability goals and objectives have been met and determine whether modifications in conveyance or additional water management actions may be needed after Stage 1 to simultaneously achieve water quality improvement, levee system integrity, and water supply reliability.
- CALFED will present the results of these reviews to the Legislature, along with its recommendations.

To provide for the best adaptive management decision making in the future, aggressive monitoring and research, as well as thorough development and evaluation of alternatives must occur. For drinking water quality issues this means Stage 1 must include the following (see pages -):

- • Performance and review of public health effects studies to more specifically identify the potential health effects of bromide related disinfection byproducts.
- • Investigation of alternative sources of high quality (low TOC, bromide, and total dissolved solids) water supply for municipal users of Delta water as a Stage 1 action.
- Investigation of advanced treatment technologies for the removal of salt, bromide, total organic carbon, and pathogens in municipal water supplies. •
- Investigation as needed of advanced treatment technologies for the removal of salt, bromide, total organic carbon, and pathogens in municipal water supplies and implement at affected sites to complement source water quality improvement actions.—

Investigation of combinations Fisheries Protection

The Ecosystem Restoration Program Strategic Plan calls for the establishment of a Science Review Panel to review science aspects of the ERP. It will be organized and provide greater public health protection will be provided with funding sufficient for the work to be adequately completed. The ability of CALFED to provide recommendations to the Legislature would be dependent on having adequately implemented necessary information collection processes and having had adequate resources for accomplishing a thorough program review as the basis for the recommendations to the Legislature.

- With the support of CALFED staff, the Science Review Panel will collect information as needed, including monitoring data from CMARP, fisheries health effects and behavioral research findings, fish screening technological developments, and cost comparisons.
- The Science Review Panel will prepare annual reports for CALFED and the Legislature to accompany the report of the Drinking Water Council, and according to the same format and schedule.

For fishery issues, Stage 1 must include adequate monitoring and research to answer the following questions (see page ___):

- What measures have been taken to restore fisheries?
- How adequate are the measures?
- How are the actions affecting target species, and are there any unexpected adverse effects on other species?

In the event of a finding that a through-Delta conveyance system was inadequate to achieve CALFED goals and objectives, other alternatives, including an isolated facility, source water substitution, and other options would be intensively evaluated for their ability to solve these problems. If an isolated facility were ultimately found to be the most cost effective method of achieving CALFED's goals and objectives, it would be designed with each of the following assurances:

1. An agreement limiting the amount, or proportion, of water that can be exported (linked to water year types and flexible enough to allow additional exports when conditions allow) and needed assurances for compliance.
2. Commitment to preserve preservation and continuous improvement of in-Delta water quality sufficient to protect existing beneficial uses (Delta standards or contracts including assurances for implementation, permits, financing, and O&M).
3. Commitment to address avoid potential seepage and flood impacts of an isolated facility along its alignment.

4. Long-term funding for Delta levees (perhaps tied to quantity of water moved in the isolated facility or other institutional assurances) and commitment to provide at cost, suitable excess excavated material from facility construction for levee and habitat improvements.
5. Reaffirm commitment to protect all area of origin water rights and to continue implementation of the 1959 Delta Protection Act.
6. Completion of all environmental documentation and permitting requirements.
7. Demonstrated commitment to finance by beneficiaries.
8. Agreement on operating authority and operating criteria.
9. There must be a determination that the through Delta conveyance with the other Program elements cannot meet CALFED goals and objectives, and that an isolated conveyance facility is the most cost-effective and least environmentally damanging measure to correct this deficiency in meeting the goals and objectives.
10. A decision to proceed with implementation of the program will come through State and Federal legislative action.

*(***insert Delta map showing the basic strategy and possible modifications***)*

4.2 Supporting Information

Each program element employs an adaptive management approach where we constantly monitor performance and modify (adapt) future actions as we learn more about the system and how it responds to our efforts. The implementation of the preferred program alternative is also facilitated by three supporting plans/programs:-

- **Assurances and Governance Plan** - A set of tools and mechanisms to assure that the Program will be implemented and operated as agreed including provision for contingency response to address potential future changing conditions.

- **Financing Plan** - Identifies financing principles, cost allocation and cost sharing considerations, and Program element cost estimates needed to adequately fund the Program over 30 years.

- **Comprehensive Monitoring, Assessment and Research Program (CMARP)** - Monitoring key system functions (or indicators), completing focused research to obtain better understanding, assessing the results, and staging implementation based on information gained are all central to the adaptive management process. These are described in more detail in the Chapter 5 Implementation Plan.

5. DRAFT IMPLEMENTATION PLAN

Phase II of the CALFED Bay-Delta Program will culminate with the Federal Record of Decision and the state Certification of the Final Programmatic EIS/EIR (expected to be completed late 1999). At that time, Phase III of the CALFED Bay-Delta Program will begin implementation of the preferred program alternative. Phase III is expected to extend 30 years or more.

Program implementation during Phase III will be guided by the implementation plan. The plan focuses on the early years of implementation when needed actions are better known but also provides a long-term vision for continuing implementation over the next several decades.

The implementation plan cannot be completed until the final programmatic EIS/EIR is completed and the complete "decision" is defined. Therefore, this draft implementation plan, like other chapters of the *Revised Phase II Report*, is a work in progress. The draft implementation plan contains the following parts:

- **Actions and Assurances for 1998-99** - CALFED agencies will use their existing authorities to pursue ongoing actions which are consistent with the CALFED framework
- **Stage 1 Actions** - A list of proposed actions for the first seven years of implementation following the Record of Decision and Certification of the EIS/EIR
- **Water Operations** - Draft concept for water operations criteria for the first seven years of implementation
- **Assurances and Governance Plan** - Set of tools and mechanisms to assure that the Program will be implemented and operated as agreed
- **Financing Plan** - Plan for funding the implementation of the preferred alternative including financing principles, cost allocation and cost sharing considerations, and Program element cost estimates
- **Comprehensive Monitoring, Assessment and Research Program** - Plan for monitoring and research that provides the data and necessary information to evaluate the performance of completed actions for use in supporting the adaptive management of future actions
- **Adaptive Management** - Plan to constantly monitor the Bay-Delta system and adjust future implementation as we learn more about the system and how it responds to our efforts
- **Long-Term Implementation** - A general vision (subject to adaptive management and the conditional decisions) for the 30-year Program implementation
- **Draft Stage 1 Environmental Compliance Strategy** - Framework for efficient processing of information needed for conforming with the regulatory procedures of the different agencies and their protocols, guidelines and time lines

5.1 Actions and Assurances for 1998-99

During the period before the final EIS/EIR and ROD are issued in the fall of 1999, the CALFED agencies will continue to make progress in implementing, coordinating, and expanding ongoing project specific actions to provide additional benefits for environmental, urban, and agricultural users, where consistent with the CALFED Bay-Delta Programmatic framework. Project specific actions to pursue include:

- Complete programmatic implementation plan
- Develop and implement the annual CVP/SWP Operations Plan
- Expand south of Delta groundwater storage
- Facilitate additional short-term water transfers
- Improve coordination of Category III, Bay-Delta Act, CVPIA and other expenditures for ecosystem restoration projects
- Initiate environmental documentation and feasibility analysis for projects that could be implemented early in Stage I
- Target and increase funding for water conservation, reclamation, water quality, and floodplain and watershed management programs
- Seek continued funding for Delta levees program:
- Issue final State Water Resources Control Board water rights decision to allocate responsibility for meeting the 1995 Water Quality Control Plan
- Extend the Bay-Delta Accord to provide operational and environmental stability through December 1999, at which time CALFED anticipates the ROD will be issued
- Resolve permitting issues and, as appropriate, initiate south Delta improvement actions
- Incorporate ongoing and planned monitoring and studies into the CALFED Comprehensive Monitoring Assessment and Research Program (CMARP)

Attachment D contains a short summary of each action.

Note: Most actions prior to the ROD have been moved to the appropriate program element description

5.21 Stage 1 Actions

Stage 1 is defined as the seven year period commencing with the final decisions on the Programmatic EIS/EIR. Agreement on Stage 1 actions is only one part of the decision for a preferred program alternative but, it is important that these actions achieve balanced benefits and

lay a solid foundation for successful implementation of the Program.

The following pages provide more detail on potential actions for Stage 1. **These actions will be more fully developed as parts of the preferred program alternative for the Revised Draft Programmatic EIS/EIR and for the Final Programmatic EIS/EIR.**

Adaptive management is an essential part of the implementation strategy for every program element to allow necessary adjustments as conditions change in future stages of implementation and as more is learned about the system and how it responds to restoration efforts. Consistent with the concept of adaptive management, some actions may need to be refined within the time frame of Stage 1 to reflect changing conditions or new information.

The outcome of and certain sites for Stage 1 decisions will not be known until additional information, including need for mitigation, is available and until the options to carry out these Stage 1 proposals have undergone environmental review. Consequently, the outcome could be altered as a result of that second tier environmental review and mitigation measures imposed as a part of those actions. However, if the impacts from the actions in Stage 1 have been included in the Programmatic EIS/EIR, the subsequent environmental documents can tier off the Programmatic document for cumulative and long-range impacts of the Programmatic decision.

Each potential action in the following Stage 1 list includes an estimate (in parenthesis) of when the action may occur within Stage 1. For example, "(yr 1)" indicates the action is expected to occur in the first year following the final decisions on the Programmatic EIS/EIR.

CALFED will continue work between the Revised Draft EIS/EIR and the Final EIS/EIR on grouping the Stage 1 actions into a series of bundles (packages) which can provide additional assurances for balancing benefits. For example, a package of actions in the Delta could include levee work, habitat improvements, water quality work, and facilities and operations to improve water supply reliability. Packages for some actions may be geographical, based on timing, or other grouping. Linking the actions would help assure that they all move forward together. These may be linked within the same project EIS/EIRs, tied by contractual documents, dependent on the same funding, or other means.

Levees

The focus of the long-term levee protection element of the Program is to reduce the risk to land use and associated economic activities, water supply, infrastructure, and the ecosystem from catastrophic breaching of Delta levees. Levee protection is an ongoing effort which builds on the successes on ongoing programs and consists of:

- *Base-level funding to participating local agencies*

- *Funding of special improvement projects for habitat and levee stabilization to augment the base-level funding*
- *Grant projects to develop best management practices for subsidence control*
- *An advanced measures plan and emergency management plan to more effectively plan for and deal with potential levee disasters*
- *A seismic risk assessment to evaluate performance of the existing levee system during seismic events*

The first stage continues the decades-long process to improve reliability of Delta levees.

1. Develop and implement an outreach, coordination, and partnering program with local landowners including individuals, cities, counties, reclamation districts, resource conservation districts, water authorities, irrigation districts, farm bureaus, other interest groups, and the general public to assure participation in planning design, implementation, and management of levee projects (yr 1).
2. Obtain short-term federal and state funding authority as a bridge between the existing Delta Flood Protection Authority (AB360) and long-term levee funding (yr 1-5).
3. Obtain long-term federal and state funding authority (yr 1-7); e.g., the Corps of Engineers' current Delta Special Study would develop into a long-term Delta levee reconstruction program and the state would be the local cost-sharing partner.
4. Conduct project level environmental documentation and obtain appropriate permits for each bundle (package) of Stage 1 actions (yr 1-7).
5. ~~Implement demonstration projects for levee designs that minimize the need for continuous disruption of habitat from levee maintenance and minimize the need for ongoing mitigation from disrupted habitat~~ Implement demonstration projects for levee designs, construction techniques, sources of material, and maintenance techniques that maximize ecosystem benefits while still protecting lands behind levees. Give priority to those levee projects which include both short (i.e. construction) and long-term (i.e. maintenance and design) ecosystem benefits, and which will provide increased information (yr 1-7).
6. ~~Coordinate Delta levee improvements with ecosystem improvements (yr 1-7); e.g., coordinate improvements, modify maintenance manuals as appropriate to accommodate ERP actions near levees, separately track levee mitigation costs and ERP costs.~~ Adaptively coordinate Delta levee improvements with ecosystem improvements by incorporating successful techniques for restoring, enhancing or protecting ecosystem values developed by levee habitat demonstration projects or ecosystem restoration projects into levee projects. Continue to develop techniques as major levee projects are implemented (Years 1-7).
7. Fund levee improvements up to PL84-99, approximately \$114151 million [\$741 million during years 1 through 5 and \$4080 million during years 6 through 7] in

- first stage (yr 1-7); e.g., proportionally distribute available funds to entities making application for cost sharing of Delta levee improvements.
8. Further improve levees which have significant statewide benefits, approximately \$824 million [\$5860 million during years 1 through 5 and \$24 million during years 6 through 7] in first stage (yr 1-7) ; e.g., statewide benefits to water quality, highways, etc.
 9. Coordinate Delta levee improvements with Stage 1 water conveyance, water quality improvements and with potential conveyance improvements in subsequent stages (yr 1-7).
 10. ~~Institute the Emergency Management Plan~~ Enhance existing emergency response plans, approximately \$29 million in Stage 1 (yr 1-7); e.g., establish \$10 million revolving fund, refine command and control protocol, stockpile flood fighting supplies, establish standardized contracts for flood fighting and recovery operations, outline environmental considerations during emergencies.
 11. ~~Initiate a subsidence control program to develop and implement BMP's for lands adjacent to levees, approximately \$11 million for Stage 1~~ Implement current BMPs to correct subsidence effects on levees. Develop and implement BMPs to facilitate CALFED objectives and assist CMARP activities to quantify the effect and extent of inner-island subsidence and its linkages to all CALFED objectives (yr 1-7).
 12. Continue evaluation of seismic risk to integrity of the levee system and effective ways to mitigate that risk (yr 1-7).
 13. Complete total risk assessment for Delta levees (yr 1-7) and develop and begin implementation of risk management options as appropriate to mitigate potential consequences. Available risk management options may include:
 - Improving emergency response capabilities
 - Developing storage south of the Delta
 - Reducing the fragility of the levees
 - Improving through-Delta conveyance
 - Releasing more water stored north of the Delta
 - Curtailing Delta diversions
 - Continued monitoring and analysis of total risk
 - Constructing an isolated facility

Water Quality

The water quality program will consist of a wide variety of actions to provide good water quality for environmental, agricultural, drinking water, industrial, and recreational beneficial uses of water. The majority of current water quality actions rely on comprehensive monitoring, assessment, and research to improve understanding of effective water quality management and on the ultimate control of water quality problems at their sources. The Stage 1 water quality

effort focuses on reducing constituents contributing toxicity to the ecosystem and affecting water users (including BOD) and on reducing total organic carbon loading, salinity, and pathogens that degrade drinking water quality. In addition, research and pilot studies are recommended to obtain information prior to implementation of some actions. CALFED is pursuing Stage 1 actions to continually improve public health through improvements in drinking water quality which include studies and investigations that will contribute to an assessment on the need for additional conveyance actions and/or other means of providing better quality source water.

1. Prepare project level environmental documentation and permitting as needed (yr 1-7).
2. Coordinate with other CALFED program elements to ensure that in-Delta modifications maximize potential for Delta water quality improvements (yr 1-7).
3. Continue to clarify use of and fine-tune water quality performance targets and goals (yr 1-7).
4. Conduct the following mercury evaluation and abatement mercury work:
 - Cache Creek*
 - Risk appraisal and advisory for human health impacts of mercury (yr 1-5).
 - Support development and implementation of TMDL for mercury (yr 1-7).
 - Determine bioaccumulation effects in creek and delta (yr 1-4).
 - Source, transport, inventory, mapping and speciation of mercury (yr 1-7).
 - Information Management/Public Outreach (yr 5-7).
 - Participate in stage 1 remediation (drainage control) of mercury mines if federal Good Samaritan protection obtained (yr 3-5).
 - Investigate sources of high levels of bioavailable mercury (yr 4-7).
 - Sacramento River*
 - Investigate sources of high levels of bioavailable mercury, inventory, map, and refine other models (yr 3-7).
 - Participate in remedial activities (yr 7).
 - Delta*
 - Research methylization (part of bioaccumulation) process in Delta (yr 1-2).
 - Determine sediment mercury concentration in areas that would be dredged during levee maintenance or conveyance work (yr 3-7).
 - Determine potential impact of ecosystem restoration work on methyl mercury levels in lower and higher trophic level organisms (yr 3-5).
5. Conduct the following pesticide work:
 - Develop diazinon and chlorpyrifos hazard assessment criteria with DFG (yr 1).
 - Support development and implementation of a TMDL for diazinon (yr 1-7).
 - Develop BMPs for dormant spray and household uses (yr 1-3).
 - Study the ecological significance of pesticide discharges (using \$1.5

- million of ERP funds) (yr-1-3).
- Support implementation of BMPs (yr 2-7).
- Monitor to determine effectiveness (yr 4-7).
- 6. Conduct the following heavy metals work:
 - Determine spatial and temporal extent of metal pollution (yr 3-7).
 - Determine ecological significance and extent of copper contamination (yr 1-3).
 - Review impacts of other metals such as cadmium, zinc, and chromium (yr 1).
 - Participate in Brake Pad consortium to reduce introduction of copper (yr 1-7).
 - Partner with municipalities on evaluation and implementation of stormwater control facilities (yr 2-5).
 - Participate in remediation of mine sites as part of local watershed restoration and delta restoration (yr 2-7).
- 7. Conduct the following salinity reduction work:
 - Develop and implement supply water quality management activities to improve supply quality (yr 1-7).
 - Develop and implement a management plan to reduce drainage and reduce total salt load to the San Joaquin valley (yr 1-7).
 - Conduct pilot projects to evaluate the feasibility of water reuse, through agroforestry, of various concentrations of saline water (yr 4-6).
 - Study feasibility of desalination methods including reverse osmosis (yr 7).
 - Study cogeneration desalination (yr 7).
 - Implement real time management of salt discharges (yr 3-7).
- 8. Conduct the following selenium work:
 - Conduct selenium research to fill data gaps in order to refine regulatory goals of source control actions; determine bioavailability of selenium under several scenarios (yr 1-5).
 - Research interactions of mercury and selenium (yr 2-3).
 - Refine and implement real-time management of selenium discharges (yr 1-7).
 - Expand and implement source control and reuse programs (yr 1-7).
 - Coordinate with other programs (yr 1-7); e.g., recommendations of San Joaquin Valley Drainage Implementation Program, CVPIA) for retirement of lands with drainage problems that are not subject to correction in other ways. (CVPIA alone will retire approximately 70,000 acres of land with selenium-caused water quality problems during time period of Stage 1.)
- 9. Conduct the following sediment reduction work/organochlorine pesticides:
 - Participate in implementation of USDA sediment reduction program (yr 1-7).
 - Promote sediment reduction in construction arenas and urban SW, and

- other specific sites (yr 1-7).
- Implement stream restoration and revegetation work (yr 4-7).
- Quantify and determine ecological impacts of sediments in target watersheds, implement corrective actions (yr 4-7).
- Coordinate with ERP on sediment needs (yr 1-3).
- 10. Conduct the following nutrients work:
 - Complete studies of causes for DO sag in San Joaquin River (yr 1-2).
 - Define and implement corrective measures for DO sag (yr 1-7).
 - Encourage regulatory activity to reduce nutrients discharged by unpermitted dischargers (yr 1-7).
 - Develop inter-substrate DO testing in conjunction with ERP (yr 2-4).
 - Study nutrient effects on beneficial uses (yr 4-7).
- 11. Conduct the following unknown toxicity work:
 - Participate in identifying unknown toxicity and addressing as appropriate (yr 1-7).
- 12. Other actions specific to drinking water improvements:
 - Control TOC contribution through control of algae, aquatic weeds, agricultural runoff, and watershed improvement (yr 1-7).
 - ~~Study Bromide and disinfection byproduct control and implement at affected sites~~ Study brominated and chlorinated disinfection byproduct operational controls at water treatment plants and implement incremental improvements as warranted (yr 1-7)
 - Control of pathogens through control of cattle, urban storm water, sewage, boat discharge, and possibly recreational swimming; includes various projects depending on area of impact (yr 3-7).
 - Study recreational swimming impacts, wild animal impacts (yr 4).
 - Relocate Barker slough intake (yr 7+).
 - MTBE reductions in various areas (yr 3-5).
 - Address water quality problems in terminal reservoirs (yr 3-5).
 - Perform public health effects studies, as needed, to more specifically identify the potential health effects of bromide related disinfection byproducts (yr 1-3).
 - Investigate alternative sources of and means of providing high quality water supply for urban users of Delta water (yr 1-7).
 - Investigate, as needed, advanced treatment technologies for the removal of salt, bromide, total organic carbon, and pathogens in urban water supplies (yr 1-7).
 - Investigate combinations of new supplies and technologies that can minimize salt content of urban water supplies and provide greater public health protection (yr 1-7).
 - Convene a Delta Drinking Water Council in a public forum to obtain agreement on relevant technical data to inform the governing entity in its

- consideration of solutions to identified public health issues for urban users of Delta water (yr 4).
- Develop a plan sufficient to meet forthcoming EPA and Department of Health Services standards for brominated disinfection byproducts (by yr 7).
13. Conduct the following turbidity and sediment work:
- Implement protection actions in the upper watershed to reduce sedimentation of fish spawning habitat (yr 1-7).
 - Implement erosion control BMPs in the upper watershed (yr 1-7).
 - Construct sedimentation basins in urban and suburban areas (yr 1-7).
 - Evaluate use of a head control structure on lower Dominici Creek (yr 2-4).
 - Perform quantitative analysis of river sediment loads, budgets, and sources (yr 1-7).

Ecosystem Restoration

The CALFED ecosystem restoration program (ERP) is designed to maintain, improve, and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta to support sustainable populations of diverse and valuable plant and animal species. A foundation of this program element is the restoration of ecological processes associated with streamflow, stream channels, watersheds, and floodplains. Implementation of the ERP over the 20 to 30 year implementation period will be guided through an ecosystem-based, adaptive management approach. ERP goals and objectives for ecosystem, habitat, and species rehabilitation are designed to produce measurable and progressive improvements to the Bay-Delta ecosystem that should result in a high level of ecosystem health and species recovery that exceeds existing regulatory requirements while improving water supply reliability and water quality of the Bay-Delta Ecosystem. The Stage I restoration efforts are structured to accomplish significant improvement in Bay-Delta ecological health through a large scale adaptive management approach in which the actions inform management decisions in later stages of implementation.

Success of ERP Stage I actions is also critically dependent on other program elements, including water quality improvement actions throughout the Bay-Delta watershed, levee system integrity actions, and integration with a watershed management strategy and a water transfers market. The general priorities for restoration activities will be first on existing public lands as appropriate, second to work with landowners in voluntary efforts to achieve habitat goals including the acquisition of easements, third a combination of fee and easement acquisition, and fourth on acquisition of fee title as necessary to achieve program objectives. Acquisition will be on a willing seller basis and with emphasis on local coordination and partnerships and include appropriate mitigation for agricultural resource impacts. The intent is to maximize habitat benefits while minimizing land use impacts.

1. Develop and implement an outreach, coordination, and partnering program with local landowners and individuals, cities, counties, reclamation districts, the Delta Protection Commission, resource conservation districts, water authorities, irrigation districts, farm bureaus, other interest groups, and the general public to assure participation in planning design, implementation, and management of ERP projects.
2. Conduct project level environmental documentation and permitting as needed for each bundle of Stage 1 actions (yr 1-7).
3. Full coordination with other ongoing activities which address ecosystem restoration in the Bay-Delta system (yr 1-7); e.g., CVPIA, Four Pumps Agreement, etc.
4. Implement habitat restoration in the Delta, Suisun Bay and Marsh, and Yolo Bypass to improve ecological function, facilitate recovery of endangered species, and determine the feasibility and desirability of implementing larger scale habitat restoration in future stages (yr 1-7):
 - Restore major habitat corridors with a mosaic of habitat types along the Mokelumne and San Joaquin Rivers, within the Yolo Bypass, and along other major fish migration corridors as practicable (yr 1-7).
 - Implement tidal wetland restoration pilot-projects to test the effectiveness of larger scale restoration at various locations in the Delta.
 - Restore large expanses of shallow water habitat in open water areas of the Delta.
5. Implement large-scale, restoration pilot-projects on select rivers (possibly Clear Creek, Deer Creek, and the Tuolumne River) that would include implementation of all long-term restoration measures in coordination with the watershed management common program and monitoring of subsequent ecosystem responses to learn information necessary for making decisions about implementing similar restorations in Stage 2 (yr 1-7).
6. Develop an ecosystem water market (potentially \$20 million per year) and acquire at least 100,000 acre-feet of water for critical ecosystem and species recovery needs (yr 1-7).
7. Complete targeted research and scientific evaluations needed to resolve the high priority issues and uncertainties (e.g., instream flow, exotic organisms, and Bay-Delta food web dynamics) to provide direction for implementing the adaptive management process and information necessary for making critical decisions in Stage 2 (yr 1-7).
8. Establish partnerships with universities for focused research (yr 1-7).
9. Complete the remaining 60% of the easements and/or acquisition for the Sacramento River meander corridor identified under the SB 1086 Program [approximately \$30 million required]. Provide assurances for and participation by Sacramento River users and landowners that provides indemnification of affected parties against flooding impacts on neighboring landowners and impacts on water

- diverters (yr 1-7).
10. Acquire flood plain easements, consistent with ecosystem and flood control needs along the San Joaquin River in coordination with the Corps of Engineers' Sacramento and San Joaquin River Basins Comprehensive Study (yr 4-7).
 11. Continue high priority actions that reduce stressors of direct mortality to fishes (yr 1-7):
 - Aggressively screen existing unscreened or poorly screened diversion on the Sacramento River, San Joaquin River, and tributary streams.
 - Remove select physical barriers to fish passage.
 12. Continue gravel management (yr 5-7); e.g., isolate gravel pits on San Joaquin River tributaries and relocate gravel operations on Sacramento River tributaries (most gravel work would be implemented in subsequent stages with designs and plans for ecosystem reclamation of gravel mining sites).
 13. Improve research, monitoring, detection, and control of exotic species (yr 1-7):
 - Implement invasive plant management program in Cache Creek.
 - Develop ballast water management program.
 - Develop early-response invasive organism control programs.
 14. Explore ways to provide incremental improvements in ecosystem values throughout the Bay-Delta system in addition to habitat corridors described above (yr 1-7); e.g., pursue actions that are opportunity-based (willing sellers, funding, permitting, etc.), provide incremental improvements on private land through incentives, develop partnerships with farmers on "environmentally friendly" agricultural practices, etc.
 15. Incorporate ecosystem improvements with levee associated subsidence reversal plans (yr 1-7).
 16. Evaluate the feasibility of harvest management to protect weaker stocks (yr 1-7).
 17. Implement projects on selected streams to remove dams or other barriers to provide additional upstream fishery habitat (yr 1-7).

Water Use Efficiency

~~The CALFED water use efficiency element focuses on formulation of policies which support implementation of efficiency measures at the local and regional level. The role of CALFED agencies in water use efficiency will be to offer support and incentives through expanded programs to provide planning, technical, and financial assistance. CALFED agencies will also support institutional arrangements that give local water suppliers an opportunity to demonstrate that cost-effective efficiency measures are being implemented. The first stage implements the processes which will continue in subsequent stages.~~

- ~~1. Expand State and Federal programs (DWR, USBR, USFWS, DFG, DHS, and SWRCB) to provide technical and planning assistance to local agencies in support~~

2. Create public advisory committee to advise State and Federal agencies on structure and implementation of assistance programs, and to coordinate Federal, State, regional and local efforts for maximum effectiveness of program expenditures (Yr 1-);
3. Develop a certification process for Urban Water Management Plans: select agency to act as certifying entity, obtain legislative authority, carry out public process to prepare regulations, implement program beginning with plans submitted in 2005. Access to CALFED benefits will be contingent upon certification of a supplier's Urban Water Management Plan (Yr 1-3);
4. Implement a process for certification of water suppliers' compliance with the terms of the urban MOU with respect to analysis and implementation of Best Management Practices for urban water conservation. Provide funding support for the entity selected to carry out this function. Access to CALFED benefits will be contingent upon certification of a supplier's compliance with the terms of the urban MOU (Yr 1-7);
5. Implement a process (e.g., AB 3616 Agricultural Water Management Council and CVPJA) for endorsement of water suppliers' compliance with respect to analysis and implementation of Efficient Water Management Practices. Provide funding support for the entity selected to carry out this function. Access to CALFED benefits will be contingent upon endorsement of a supplier's compliance with the terms of the process (Yr 1-7);
6. Resolve legal, institutional, and funding limitations for agricultural and urban water recycling. Secure loan and/or grant funding for water conservation (\$200 million in Stage 1) and water recycling (\$500 million in Stage 1) capital improvement projects. (Yr 1-3);
7. Develop and implement a program to improve local water management for multiple benefits. This program would help meet CALFED objective for water supply reliability, water quality, and ecosystem quality by identifying appropriate local actions, apportioning benefits and associated cost shares, securing funding, and providing technical implementation assistance (Yr 1-7);
8. Implement the methodology for refugee water management which was recently developed, based upon stakeholder and scientific input, including preparation of an Effective Water Use Plan and annual reports by each refugee manager (Yr 1-7); Consistent with assurance mechanisms for urban and agricultural water users, access to CALFED benefits will be contingent upon continued implementation of the Effective Water Use Plan (Yr 1-7);

The CALFED water use efficiency element focuses on formulation of policies which support implementation of efficiency measures at the local and regional level. The CALFED Water Use Efficiency Program will: 1) establish measurable objectives; 2) offer support and incentives through expanded programs to provide planning, technical, and financial assistance; 3) monitor

progress towards objectives; and, 4) if these objectives are not met, provide for the reopening of the setting and implementation of objectives. CALFED agencies will also support institutional arrangements that give local water suppliers an opportunity to demonstrate that cost-effective efficiency measures are being implemented. The first stage implements the processes which will continue in subsequent stages.

1. Develop Measurable Objectives: Prior to the ROD, develop measurable objectives for agricultural water use efficiency. Measurable objectives are objectives for improvements in water management, which can be measured or otherwise tracked to assure that such improvements occur. Objectives will include outcome indicators based on actual water use. Objectives must result in reduced demand on Bay-Delta systems, in increased water quantity or improved timing of instream flow or other specific CALFED objectives. Objectives may vary by region. The objectives will be used to inform two sets of decisions: 1) whether and when new storage and conveyance facilities are permitted, constructed and operated; and 2) whether an individual district receives CALFED benefits. The programmatic decision is to be tied to the achievement of the goals identified in the Strategic Plan. The decision regarding access to CALFED benefits will be linked to the development and achievement of the individual plan submitted to the AWMC. Submit to state and federal legislatures requests for funding this program at an annual rate of \$ ____ million.
2. Develop Baseline/Reference Conditions: Establish baseline or reference conditions in order to evaluate future progress. There will be an independent review conducted in conjunction with AWMC for this purpose. Submit to state and federal legislatures requests for funding this program at an annual rate of \$ ____ million (yr 1-3).
3. Expand Existing State and Federal Conservation Programs: Expand State and Federal programs (DWR, USBR, USFWS, DFG, DHS, and SWRCB) to provide technical and planning assistance to local agencies in support of local and regional conservation and recycling programs. Submit to state and federal legislatures requests for funding this program at an annual rate of \$ ____ million (yr 1-7).
4. Create Public Advisory Committee: Create public advisory committee to advise State and Federal agencies on structure and implementation of assistance programs, and to coordinate Federal, State, regional and local efforts for maximum effectiveness of program expenditures. Submit to state and federal legislatures requests for funding this program at an annual rate of \$ ____ million (yr 1).
5. Develop Urban Certification Process: Develop a certification process for Urban

Water Management Plans: select agency to act as certifying entity, obtain legislative authority, carry out public process to prepare regulations, implement program beginning with plans submitted in 2005. Access to CALFED benefits will be contingent upon certification of a supplier's Urban Water Management Plan. Submit to state and federal legislatures requests for funding this program at an annual rate of \$ _____ million (yr 1-3).

6. Implement Urban Certification Process: Implement a process for certification of water suppliers' compliance with the terms of the urban MOU with respect to analysis and implementation of Best Management Practices for urban water conservation. Provide funding support for the entity selected to carry out this function. Access to CALFED benefits will be contingent upon certification of a supplier's compliance with the terms of the urban MOU. Submit to state and federal legislatures requests for funding this program at an annual rate of \$ _____ million (yr 1-7).
7. AWMC Evaluation of Agricultural Water Management Plans. Utilize the AB3616 Agriculture Water Management Council (AWMC) to evaluate and endorse plans to implement cost-effective water management practices by agricultural districts. Identify and secure ongoing funding sources for AWMC and its members seeking to actively participate in the development, review, and implementation of these plans. Candidate activities include: administration, including staff, of the AWMC itself; implementation of approved practices; and participation by individual signatories. Access to CALFED benefits for a given agricultural district will be contingent upon AWMC's endorsement of the adequacy of its water management plan and implementation. Submit to state and federal legislatures requests for funding this program at an annual rate of \$ _____ million (Yrs. 1-7).

[NOTE: Focus Group still deliberating several issues related to AWMC, including but not limited to: 1) form of action of such plans; 2) specific activities for which such funding will be sought; and, 3) phasing in of certification over time.]

8. Resolve Water Recycling Limitations: Resolve legal, institutional, and funding limitations for agricultural and urban water recycling. Secure loan and/or grant funding for water conservation (\$200 million in Stage 1) and water recycling (\$500 million in Stage 1) capital improvement projects. (yrs. 1-3).
9. On-Farm Outreach Program: Develop and implement an agricultural water use efficiency program in cooperation with the NRCS, USBR, DWR, Resource

Conservation Districts, and other appropriate entities. The purpose of the program would be to encourage on-farm utilization of cost-effective agricultural water management practices that accrue multiple benefits. The AWMC will be used to assist in soliciting and selecting individual projects to best meet the objectives developed through the Ecosystem Restoration and Water Quality Programs and to improve water supply reliability. Local entities such as water districts and cooperative extension offices will be encouraged to work with RCDs to submit proposed projects. Priority will be given to on-farm projects that are designed to achieve specific Delta-related benefits (e.g., improving water quality as opposed to general assistance or information dissemination). Submit to state and federal legislatures requests for funding this program at an annual rate of \$25 million (yr 1-7).

10. Refuge Water Management: Implement the methodology for refuge water management which was recently developed, based upon stakeholder and scientific input, including preparation of an Effective Water Use Plan and annual reports by each refuge manager (yr 1-7). Consistent with assurance mechanisms for urban and agricultural water users, access to CALFED benefits will be contingent upon continued implementation of the Effective Water Use Plan. Submit to state and federal legislatures requests for funding this program at an annual rate of \$ _____ million (yr 1-7).
11. Research to Improve WUE Actions: Encourage and support research to expand potential water use efficiency measures. Submit to state and federal legislatures requests for funding this program at an annual rate of \$ _____ million (yrs 1-7).
12. Agricultural Financial Incentive Program: Develop, in consultation with the Agricultural Water Management Council, a program of technical and financial incentives for the implementation of water use efficiency measures in agricultural sector. This program will consider several factors, including: (a) potential for reducing irrecoverable water losses; (b) potential for attaining environmental and/or water quality benefits from water use efficiency measures which result in reduced diversions; (c) regional variation in water management options and opportunities; (d) availability and cost of alternative water supplies; and (e) whether the recipient area experiences recurrent water shortages [due to regulatory or hydrological restrictions]. The financial incentives should generally take the form of loans for actions or activities that have been identified as cost-effective for the district in a water management plan approved by the Agricultural Water Management Council. The financial incentives should generally take the form of incentive grants for water use efficiency measures that are supplemental to measures that are cost-effective at the district level. The program will be administered jointly by appropriate state and federal agencies. Funding for this

program should total \$700 million during Stage 1, with funding amount increasing throughout Stage 1 as the program is developed and implemented. Funds will be provided by state and federal agencies from appropriations and/or bond measure proceeds pursuant to a cost-share agreement to be developed before the Record of Decision. (Yr 1-7).

[NOTE: Focus group support for this provision was subject to some qualifiers. (1) Using the AWMC process to identify cost-effectiveness and to take an active role in this incentive program was viewed as appropriate by some members only if there is a process outside of the AWMC for setting overall CALFED goals for WUE common program. (2) Many members believed that financial incentives in excess of the \$700 million in Stage 1 may be appropriate.]

13. Assess the Need for Additional Water Rights Legislation: Before the CALFED Record of Decision (ROD), the State Water Resources Control Board and California Attorney General's Office will, after consultation with other CALFED agencies, the Legislature, and stakeholders, evaluate the need for additional state legislation providing that a water rights holder's water rights will not be impaired solely because that water rights holder has implemented water use efficiency measures and subsequently transferred water to other beneficial uses. If this evaluation determines that such state legislation is necessary, proposed legislation will be submitted to the Legislature by the CALFED agencies. Submit to state and federal legislatures requests for funding this program at an annual rate of \$ _____ million (yr 1-4).

[NOTE: Some in the Focus Group want to revisit this issue, believing that we really should move past mere evaluation.]

14. Water Measurement Program: Develop, after consultation with CALFED agencies, the Legislature, and stakeholders, state legislation that requires appropriate measurement or metering of water use for all state water users in the state of California. For municipal and industrial users, water use must be metered. For agricultural water users, water use must be measured with an accuracy equivalent to or surpassing the accuracy required of federal water contractors under the Central Valley Project Improvement Act. Submit to state and federal legislatures requests for funding this program at an annual rate of \$ _____ million (yr 1-7).

[NOTE: There is not yet agreement on this action from the members of the Ag WUE Focus Group. The primary reasons for continued disagreement are: (a) the controversial nature of water measurement in certain segments of the community; (b) the question of measuring groundwater as opposed to surface water use; (c) the appropriate level (district versus field versus something else) for ag water users; and, (d) the conflict between the AWMC MOU process that relies on "estimation" as opposed to "measurement."]

15. Linkages to Transfers: [The Focus Group is still developing language for this proposed action.] Submit to state and federal legislatures requests for funding this program at an annual rate of \$ _____ million (yr 1-7).
16. Encourage and support research to expand potential water use efficiency measures (yr 1-7).

Water Transfer Framework

The water transfer framework is designed to facilitate and streamline the water transfer process while protecting water rights and legal users of water and addressing and avoiding or mitigating third-party socio-economic impacts and local groundwater or environmental impacts. This would occur through a proposed framework of actions, policies and processes. The first stage implements the processes which will continue in subsequent stages.

1. Establish the California Water Transfers Information Clearinghouse to collect and disseminate data and information relating to water transfers and potential transfer impacts, perform research using historic data to understand water transfer impacts, and provide a forum for discussion and comment on proposed transfers (yr 1).
2. Coordinate with CALFED agencies to formulate policy, under their existing authorities, for required water transfer analysis (yr 1).
3. Begin forecast and disclosure process (DWR and USBR) of potential conveyance capacity in existing export facilities. This would be an on-going activity, occurring in conjunction with hydrologic forecasts (yr 1).
4. Develop a standardized checklist and analysis procedure (SWRCB, DWR, and USBR) to be followed by transfer proponents for proposed transfers (yr 1-2).
5. CALFED agencies work with stakeholder representatives to reduce the conflict between transfer proponents and the SWRCB, DWR, or USBR regarding what water is deemed transferrable under what conditions (yr 1-3).
6. CALFED agencies continue work with stakeholder representatives to resolve conflicts over reservoir refill and carriage water criteria (yr 1-3).

7. CALFED agencies will work with stakeholders to develop and issue appropriate rules, regulations, or procedures to make these environmental water transfers effective (yr 4-7).
8. CALFED agencies will work with stakeholders to develop an agreed upon set of criteria and procedures governing the determination of transport system availability and costs, including the procedures to determine the fair reimbursement to the water conveyance facility operator (yr 1-3).
9. CALFED agencies work with stakeholders to develop and issue interim rules, regulations or procedures necessary for an effective water transfer market pending long term resolution of definitional and procedural issues identified in Items 1-8, above (yr 1-2).
10. CALFED agencies work with the Legislature and stakeholders to discuss whether proposals for amending state law regarding water rights, including area of origin priorities, are necessary (yr 1-2).
11. CALFED agencies will work with stakeholders, the Legislature, and local agencies to identify appropriate assistance to enable local agencies to develop and implement groundwater management programs to protect groundwater basins in water transfer source areas (yr 1-2).
- ~~12. CALFED agencies adopt methods to monitor instream transfers and develop associated tracking measures (yr 2-4).~~
- ~~13. CALFED agencies adopt criteria governing the determination of transport costs in state and federal conveyance facilities (both existing and new, if constructed) (yr 2-4).~~

Watershed Program

The Watershed Program ~~is designed to~~ will be coordinated and integrated with existing and future local watershed programs and ~~to provide technical assistance and funding for watershed activities that support the goals and objectives of the CALFED Bay-Delta Program.~~ The actions during Stage 1 are a mix of watershed coordination, restoration, maintenance, and conservation activities, as well as demonstration projects designed to show benefits to the Bay-Delta system ~~without harm to~~ while also benefitting existing watershed resources.

1. Fund and implement watershed restoration, maintenance, conservation, and monitoring activities that support the goals and objectives of the CALFED Bay-Delta Program (years 1-7).
2. Identify priority locations and implement watershed restoration activities which benefit restoration in the Bay-Delta system (years 1-7).
3. Assist local watershed groups and government agencies to address common issues, including roles and responsibilities, funding support, technical assistance, information exchange, and to ensure effective communication and implementation

- among government agencies and stakeholder groups (years 1-7).
4. Develop and implement a funding process and provide watershed stewardship funds to build the capacity of locally controlled watershed groups that ensure participation of local landowner groups (years 1-7).
 5. Improve the use and usefulness of existing or future watershed clearinghouse functions to assist watershed groups with obtaining information on funding opportunities, technical assistance, and data storage and retrieval (years 1-7).
 6. Ensure the completion of project level environmental documentation and permitting; assist with documentation and permitting processes as appropriate (years 1-7).
 7. Evaluate the benefits (including economics) that accrue from watershed plans and projects designed to achieve CALFED goals and objectives (yr 1-7).
 8. Establish, fund, and maintain watershed restoration and maintenance assistance to aide local watershed groups and private landowners in project concept, design, and implementation (years 1-7).
 9. Coordinate with other CALFED and non-CALFED programs on watershed related activities (years 1-7).
 10. Work with stakeholders and the Legislature to develop a state-wide umbrella watershed management act (yr 1-3).

Storage

New storage will be included in the preferred program alternative as necessary to meet CALFED's goals and provided conditions and linkages for implementation are satisfied.

Groundwater Banking and Conjunctive Use - *This first stage includes a coordination effort with local implementing entities and landowners, and may include construction of several projects. Additional projects, if feasible, could be constructed in later stages.*

1. Develop and implement a framework for groundwater banking and conjunctive use projects (yr 1).
2. Include provision to protect overlying and other landowners' water rights (yr 1-7).
3. Provide funding assistance for groundwater plan development (yr 1-7).
4. Identify potential projects and local cooperating entities and define CALFED role (yr 1-7).
5. Conduct baseline monitoring and modeling (yr 1-7).
6. Initiate field studies (yr 2-7).
7. Project environmental documentation and permitting (yr 3-7).
8. Project design (yr 4-7).
9. ~~Conduct demonstration projects and~~ Construct two to three production groundwater banking facilities with target volume of 500,000 acre-feet storage (yr

1-7); e.g., potential options include Madera Ranch, Stockton East, expanded Kern Water Bank, and others.

Surface Storage - *New offstream storage and/or expansion of existing onstream reservoirs could add up to several million acre-feet of new surface storage. A description of three to five possible sites will be available at the start of Stage 1. The first stage will consist of feasibility studies, evaluations, and permitting compliance procedures. Initiation of construction will proceed as necessary to meet CALFED program goals provided conditions and linkages have been satisfied.*

1. In conjunction with FERC relicensing and with the consent of project owners/operators, perform reoperation analysis for existing hydroelectric power reservoirs to benefit local and downstream water users, water quality, and environmental issues. With consent of project owners/operators, implement changes in operations, including funding of acquisitions, where appropriate (yr 1-7).
2. Identify initial local partners and other cooperating entities for projects and CALFED role (yr 1-3).
3. Develop environmental documentation (yr 1-5).
4. Perform feasibility studies (yr 1-5).
5. Perform field studies (yr 1-5).
6. Finalize 404(b)(1) analyses (yr 1-5).
7. Site selection (yr 4-5).
8. Evaluate improvements to potential conveyance to storage (yr 1-5).
9. If ready, obtain permits and negotiate operating agreements (yr 5-7).
10. Identify beneficiaries and negotiate cost sharing agreements (yr 5-7).
11. Begin construction if conditions and linkages are satisfied (yr 6-7).

Conveyance

CALFED's basic strategy is to develop a through Delta conveyance alternative based on existing Delta configuration with some modifications. Some construction of improvements in the south and north Delta should occur within the first stage to improve conditions for ecosystem and water management reliability. Part of the first stage consists of studies and evaluations of the major conveyance features. This will allow conveyance projects to be ready for permitting and construction in later stages should the projects be necessary to meet Program objectives.

South Delta Improvements - *South Delta improvements consist of methods to control flow, stage and circulation, improve fish passage, fish screen and salvage facilities, and provide SWP/CVP interties upstream and downstream of the export pumps. South Delta conveyance improvements included in Stage 1 would function with the basic conveyance*

strategy or potential modifications.

1. Complete environmental documentation and permitting including 404(b)(1) analysis (yr 1).
2. Design south Delta improvements (yr 1); among others, such improvements could include: [***list is being revised***]
 - Operable fish barrier at head of Old River to improve San Joaquin salmon survival and improve water quality in lower San Joaquin River below the Barrier (*Note: May impair upstream migration of San Joaquin salmon in the fall and increase entrainment of organisms living in the central and southern Delta*)
 - Three south Delta waterway control structures to protect south Delta agricultural water supplies
 - Clifton Court Forebay intake structure
 - Channel enlargement along Old River
 - Modified operation rules, including increased use of full capacity of Banks Pumping Plant linked to improved fish protections (flexible operations)
3. Implement south Delta improvements [balanced to improve water supply and environmental conditions] (yr 2-4).
4. Determine whether to implement an intertie between the Delta-Mendota Canal (at approximately Mile 8) and the California Aqueduct downstream of export pumps (yr 2-4) and if determined to be needed implement the project (yr 5-7).
5. Construct new Tracy demonstration/testing fish screen and handling facility capable of screening 2,500 cfs at 0.2 fps through-screen velocity and 5,000 cfs at 0.4 fps through-screen velocity (yr 1) *Notes: Screen operation would be under criteria established by NMFS, FWS, and DFG. There may be some stranded costs if the point of diversion is moved sometime in the future. The facility would be operated for the following purposes:*
 - *Improve survival of salvaged fish at the Tracy pumping plant*
 - *Reduce entrainment at the Tracy pumping plant*
 - *Provide valuable information for design of future fish facilities*
6. Convert fish screen demonstration project at Tracy Pumping Plant to production facility and expand capacity if appropriate (yr 4-6).
7. Implement first increment of new south Delta fish screening and fish handling facility at the northeast entrance to Clifton Court Forebay [full module capable of screening 6,000 cfs at 0.2 through-screen velocity and 12,000 cfs at 0.4 fps through-screen velocity] (yr 2-6) ; *Notes: Screen operation would be under criteria established by NMFS, FWS, and DFG. There may be conflicts with higher pumping rates (e.g., over pumping screens or exporting water that is not first screened). Facility would be operated for the following benefits:*
 - *Improve survival of fish in the south Delta near the State export pumping plant*

- *Reduce predation of fish in Clifton Court Forebay*
 - *Reduce exposure of fish residing in or migrating through the central and south Delta to entrainment*
8. Evaluate (and, if promising, pilot test) benefits/impacts of recirculation of a portion of Delta Mendota Canal flows through the Newman Wasteway to the San Joaquin River for water quality and ecosystem enhancement (yr 1-4).
 9. Project environmental documentation and permitting for SWP/CVP intertie (yr 2-4).
 10. Design and construct SWP/CVP intertie upstream of export pumps [tie Tracy Pumping Plant intake to Clifton Court Forebay] (yr 5-7+).
 11. Implement joint point of diversion for SWP/CVP (This is a SWRCB permit action which would allow the SWP to pump CVP export flows and vice versa (yr 1-7)).

North Delta Improvements - *North Delta improvements consist of a new screened diversion from the Sacramento River near Hood to the central Delta and significant channel modifications including setback levees. The screened diversion and associated channels may be implemented in modular stages in order to resolve technical screening and fish passage issues at the appropriate scale. Stage 1 will focus on studies and design prior to construction. Selected channel improvements may be constructed but the majority of the improvements, if any are selected, will be constructed in Stage 2. These Delta channel improvements are the basic conveyance strategy of the preferred program alternative.*

1. Prepare project environmental documentation (yr 1-5).
2. Conduct feasibility studies for screened diversion and fish passage facilities, channel modifications, and habitat improvements (yr 1-5).
3. Conduct field studies (yr 1-5).
4. Prepare environmental documentation for land acquisition (yr 2-3).
5. Acquire land and convert land use for habitat and flood protection improvements (yr 4-6).
6. Obtain permits and operating agreements (yr 4-6).
7. Design selected improvements (yr 4-6).
8. Construct selected improvements including channel improvements such as setback levees, channel dredging, and waterside berms (yr 7).
9. Construct new Hood diversion test facility on the Sacramento River capable of diverting up to 2,000 cfs from the Sacramento River to the Mokelumne River (yr 4-6) *Notes: The facility would have an alignment that would be usable with potential future through Delta modifications or isolated facility. Environmental documentation will be completed and appropriate mitigation adopted if necessary (e.g. Mokelumne River fisheries) prior to construction. The facility would be operated for the following purposes:*

- Test screening efficiency, cleaning and bypass mechanisms
 - Test upstream passage mechanisms
 - Enable closing the Delta Cross Channel without compromising interior Delta and export water quality
 - Improve Delta water quality
 - Improve cues for migrating fish
10. Pilot studies for dredge material reuse (yr 1-7).

Isolated Facility - *The isolated facility (a new canal or pipeline connecting the Sacramento River in the northern Delta to the SWP and CVP export facilities in the southern Delta) is not included in the basic Delta conveyance strategy will only be built if and when the through Delta conveyance actions coupled with other CALFED actions cannot meet CALFED goals and objectives. The following Stage 1 actions provide progress on initial studies in case the isolated facility is found necessary to meet CALFED objectives. Stage 1 studies relating to continuously improving public health through improved drinking water quality (see Water Quality section on pages ___ - ___ and CMARP section on page ___) will be considered in determining whether those goals and objectives have been achieved without an isolated facility and/or other means of providing better quality source water. Stage 1 studies (see CMARP section on page ___) relating to actual fishery recovery, the entrainment effects of the south Delta export facilities, and the benefits and negative impacts of relocating the diversion point will also be assessed.*

1. Perform public health effects studies to more specifically identify the potential health effects of bromide related disinfection byproducts (yr 1-3).
2. Investigate alternative sources of high quality water supply for urban users of Delta water (yr 1-3).
3. Investigate advanced treatment technologies for the removal of salt, bromide, total organic carbon, and pathogens in urban water supplies (yr 1-3).
4. Investigate combinations of new supplies and technologies that can minimize salt content of urban water supplies and provide greater public health protection (yr 1-3).
5. Convene an expert panel in a public forum to make recommendations to the governing entity regarding solutions to identified public health issues for urban users of Delta water (yr 4)
 1. Model potential operation scenarios for an isolated facility tied to modeling of water quality and fisheries to help in overall assessment of the need for an isolated facility and/or other means of providing better quality source water (yr 1-7).
 2. Conduct the following actions as warranted:
 - Prepare project environmental documentation (yr 4-or after).
 - Conduct feasibility studies (yr 4-or after).

- Conduct field studies (yr 4-or after).
- Assess right-of-way issues that could impact CALFED's ability to maintain a viable option for a potential future habitat and facility corridor (yr 4-or after).

Assurances & Institutional Arrangements

An assurances package is a set of actions and mechanisms to assure that the Program will be implemented and operated as agreed. The assurances package will include mechanisms to be adopted immediately as well as a contingency process to address situations where a key element of the plan cannot be implemented as agreed. While the principles for the assurances package will be substantially complete before beginning Stage 1, many details remain to be finalized early in Stage 1 after the federal ROD and the state Certification.

1. Finalize coordination among agencies or new entity (yr 1-3); e.g., provide for ecosystem restoration authority within the individual CALFED agencies or in a new organization with responsibility for ecosystem restoration.
2. Expand on the conservation strategy (yr 1-3); next steps will implement mechanisms that will provide regulatory certainty for specific projects or bundled projects whose actions were identified in the ROD for completion during Stage 1.
3. Recommend legislation, if necessary, to implement new institutional arrangements or facilitate program implementation (yr 2-3). Legislation could serve to create a new entity or modify water transfer law and statutes to facilitate an appropriately protective water transfer framework recognizing law that may exist at that time. For any legislation to implement new institutional arrangements that would facilitate increased water transfers out of the Delta, include reaffirmation and enhancement of existing laws such as the Delta Protection Act, the Feigenbaum Act, the Watershed Protection Act, and the Protected Areas Act (Water Code §§1215, 1222, 1216, and 1217 [a]).
4. Incorporate the final State Board's water rights decision for allocation of responsibility to meet flow requirements for Water Quality Control Plan 95-FWR6 (May 1995) in water transfer and operational rules.
5. Implement a CALFED environmental documentation, mitigation, and permit coordination process (yr 1-7).
6. Implement and revise contingency response as needed (yr 1-7).
7. Develop guidelines and support legislation for federal Good Samaritan protections for mine remediation (yr 1-2).

Finance

The financial package will seek to finance the preferred program (total Program costs for improvements, mitigation, and ongoing annual operating and maintenance costs) through a combination of federal, state, and user funds. This financing will be needed over several decades as the various parts of the preferred program alternative are implemented, operated, and maintained. An agreement on the financial principles including the benefits-based approach, guidelines for public/user cost split, provisions for crediting for other parallel efforts, provision for repayment of federal/state costs where appropriate, and cost allocation methodology or strategy will be included in an implementation agreement prior to Stage 1. These principles will recognize public and private benefits derived from water quality, environmental protection, flood control, recreation, and a reliable water supply. Stage 1 establishes the financial package for use in all stages.

1. Establish reliable short-term and long-term funding for each program element and for each package of Stage 1 actions complete as necessary (1-7):
 - Refine cost estimates (yr 1)
 - Finalize beneficiary pays principle (yr 1)
 - Finalize details surrounding repayment or crediting (yr 1)
 - Finalize cost-share agreements (yr 1).
 - Finalize appropriate user fees (yr 1-7).
 - Seek federal authorization/appropriation and seek authority to sell state bonds (yr 1-7).

Monitoring, Research, and Adaptive Management

Establish monitoring for all program elements that focuses on obtaining data on a timely basis, providing interpretation of data, and maintaining data in an accessible and useful form. The monitoring, assessment of data, and resultant need for adaptive management are required throughout the CALFED Bay-Delta Program. The first stage refines the monitoring system and procedures which will continue in subsequent stages.

1. Periodic review and refinement of the monitoring plan (CMARP) including all elements of the Program (yr 1-7).
2. Define conceptual model of Delta watershed as it relates to fish survival and other indicators of ecosystem health. Include model variables for all significant stressors, such as diversion effects, commercial fishing, exotic species, hatchery impacts, and fish barriers on tributaries (yr 1).
3. Refine monitoring program based on conceptual model to acquire data needed to test model elements and guide investment strategy (yr 1).

4. Define, review, and refine the adaptive management process for making adjustments as better information becomes available, including who makes future decisions, for all elements of the Program (yr 1-7); e.g., define triggers and time periods necessary for deciding need for change in management direction.
5. Implement baseline monitoring plan under direction of a single umbrella entity as defined in CMARP with linkage to adaptive management process and provision for stakeholder input but provide for responsible agencies to conduct additional monitoring to meet their obligations in the event that needs cannot be met by baseline monitoring plan (yr 1-7).
6. Review the ~~isolated facility decision process as developed~~ progress toward achieving CALFED goals and objectives and refine adaptive management and monitoring programs as needed to accommodate the ~~decision process~~ needs information needed for that assessment process (yr 1).
7. Complete monitoring studies identified by diversion effects on fisheries team to provide feedback on actual diversion effects of south Delta pumps (yr 2-7) *[includes long-term, system wide, baseline monitoring with focused research to increase understanding of ecological process and ways to reduce uncertainty; definition of needed studies is currently under development, following are examples]*
 - Conduct focused research on Delta hydrodynamics and linkage to food web including relation to location of diversion point.
 - Study population trends of fish using the Delta, including fish salvage at south Delta export facilities, with emphasis on San Joaquin River fall run chinook salmon, delta smelt, and Mokelumne River fall run chinook salmon and steelhead trout.
 - Expand real-time monitoring for enhanced fish protections and flexible operations for water suppliers.
8. Provide available data on need to reduce bromides, total dissolved solids, total organic carbon, pesticides and heavy metals (yr 5).
9. Provide available data on water quality in south Delta and lower San Joaquin River (yr 1-7).
10. Monitor and assess the impacts of water use efficiency measures on water demands and available supplies, and develop better information for water balances in the Bay-Delta system (yr 1-7).
11. Prepare annual reports on status/progress and need for adjustments (yr 1-7).
12. Analyze status and need for adjustments of actions for stage 2 (yr 5-7).

5.32 Water Operations

CALFED has extended the state and federal commitments in the Bay-Delta Accord to provide operational and environmental stability through December 1999.

~~***Must be updated to reflect DEFT/NoName work when complete***~~ Work is progressing on evaluating potential Delta water operations criteria for use during Stage 1 implementation. A major concern in the south Delta is the effect of continuing exports, specifically entrainment and salvage of important fish species. To address this concern, CALFED is evaluating the concept of flexible operations. Flexible operations would allow reducing export pumping at times critical to fish and increasing export pumping at other times. This will create risks to both water supply and the environment is consistent with the adaptive management approach.

Flexible operations will allow higher or lower export rates and export-to-inflow ratios than prescribed by the 1995 Water Quality Control Plan. Pumping could deviate from currently permitted rates seasonally and on a real-time basis in response to Delta flows and fish distributions. For example, the projects could reduce pumping when Delta inflow is low or when fish are present in large numbers and increase pumping when Delta inflow is high and few fish are present. An environmental water account might function to keep track of pumped and stored water that could become credits against pumping at critical environmental periods. The export rates could be altered for the following purposes:

- Reduce entrainment
- Improve foodweb productivity
- Protect fish migrating through the Delta
- Improve water supply reliability

Flexible operations has some potential negative effects:

- Impacts may shift to other species or life stages
- May locally impact water quality
- Potential loss of water supply reliability
- May reduce available water transfer conveyance capacity

The export rates would be managed ~~***to be determined***~~ in the following ways:

~~Seasonally-based on Real-Time Monitoring Response~~

- ~~More restrictive at times, providing greater environmental protection and reduced water supply~~
- ~~Less restrictive at times, providing additional water supply and water for~~

environmental benefit at later more critical periods

- ~~Shift high pumping to seasons of high flows, especially high San Joaquin flows~~
- ~~Shift high pumping to seasons of low fish sensitivity. Current requirements in the WQCP and Biological Opinions require seasonal adjustments in operations, modified by hydrological patterns. Further protection to allow recovery may need to expand on these tools. Seasonal shifts in operation may be most appropriate for conditions that occur predictably or where the times of sensitivity overlap for several species. Examples of such seasonal responses that the DEFT team has considered include: increasing the period of the Vernalis Adaptive Management Program from 31 to 60 days and relaxation of the Export/Inflow ratio to 75% in August and September~~

Operational changes [~~*** to be determined ***~~] would also include modifying flow volumes, distributions, frequency, and pathways. Flows may be changed by altering inflows, exports, barriers (e.g., Delta Cross Channel, Head of Old River barrier, Montezuma Slough salinity barrier, etc.). Proposed changes include:

- [~~*** development in progress ***~~]

Note: Work on water operations is currently under development. The following summarizes an operational scenario for Stage 1

Operational Scenario for Stage 1

An operational scenario may combine the certainty of stricter standards with the flexibility of an environmental water account. Stricter standards are most appropriate for species with predictable times of vulnerability and for which there is a good understanding of their sensitivities. Active management, wherein decisions are made based on real-time data, is most suited for those species whose needs are likely to shift greatly from year to year. Adaptive management is most suited for those species whose sensitivity to entrainment is poorly understood, and an experimental approach can be used to improve understanding. Both active and adaptive management benefit from the flexibility of an environmental water account.

Standards adequate to protect all species that might be at risk in all years are certain to have major adverse effects on water project operations, including biologically significant aspects. In addition, the mechanisms behind indirect mortality, the role of export operations on migratory success and indirect mortality, and the importance of these effects on the adult population levels

of longfin and delta smelt, are all poorly understood. Adaptive management is the preferred CALFED method for addressing such uncertainty. Adult populations of smelt vary by orders of magnitude from year to year and population sizes of most salmon vary strongly in response to hydrological conditions three years earlier. These annual fluctuations in adult population sizes tend to heighten concerns about entrainment effects in years when populations are small. Active management decision-making using an environmental water account can reduce these concerns by emphasizing protection of species in years when their populations are at greatest risk.

Environmental Water Account (EWA) Concept

An environmental water account can provide the flexible but firm basis for active and adaptive management. This flexibility can allow the manager of the EWA to provide more protections for ESA species than strict standards, while water supply and water quality are improved. The EWA is a way to shift from the current project operations in a way to increase biological protection without harming water users. An EWA account can have a combination of water and money assets that would allow an EWA manager to reduce direct and indirect mortality and enhance the ecosystem. For example, an EWA could be used to reduce exports at critical times that cannot be will defined in advance, by drawing out of the account (storage south of the Delta) to make the exporters whole, or use EWA money assets to purchase replacement water. The account could be filled by purchases, trades, or flexing an environmental standard (at the discretion of the EWA manager). The account could be held in surface reservoirs, groundwater and or option contracts in locations upstream, in-Delta, and /or south of the Delta.

EWA assets grow over time by:

- Refillable, high priority storage
- Water options and purchases
- Access to facilities for diversion and transport
- Water conservation/reclamation
- Ability to grant variances to export standards
- Contingency fund

Water User assets grow over time by:

- Expanded access to diversion facilities
- Increased storage
- Water transfers
- Water in exchange for mortality reductions

Process

CALFED will be developing a combination of prescriptive standards and EWA that move the

program progressively towards recovery of the species. A workable combination of water and financial assets will be developed for an EWA that would allow continuous management for supply, fish and quality.

There are several problems to be overcome such as: how can protection be afforded to species early in the water year when the account may be empty? How can environmental water be stored for later use in a system limited by storage? How can protection be ensured when protective needs exceed the water available?

Basic decisions needed for an EWA?

- What are the default operational rules
- Sharing future export/storage capacity increases
- Sharing of pumping above default rules
- Environmental priorities for existing facilities
- Decision making authority
- Regulatory certainty
- Who pays
- Carryover of ecosystem credits from year to year
- Other uses of ecosystem credits
- Initial funding and type of ecosystem credits

Other EWA discussion points

- Relationship to upstream water
- Fungibility of EWA credits
- Operating/Accounting Procedures
- Environmental priorities for storage and conveyance facilities
- Biological aiming points
- Decision making authority
- Regulatory certainty

Operational Issues

- Access to/ Sharing of new and existing facilities for EWA water
- Secured debt/ delayed payback of EWA water
- Actual amount of environmental protection possible, given EWA assets

5.43 Assurances and Governance

Overview

CALFED's assurances package consists of a set of tools and mechanisms to assure that the Program will be implemented and operated as agreed. For some stakeholders, assurances also means a level of protection from the potential adverse impacts of program actions. The assurances package includes mechanisms to be adopted immediately as well as components for the long term, such as the conservation strategy linkages between program actions and the contingency response process. While the principles of a longer-term assurances package for the remainder of the program will be substantially complete before beginning Stage 1, the details of some components will remain to be finalized during Stage 1 issuance of the Record of Decision (ROD). A more complete description of the draft Assurances Plan can be found in Attachment D finalized during Stage 1.

The assurances package is an integral part of the implementation plan and includes assurance mechanisms which are program-wide and element-specific, internal and external, long term and short term. Internal assurances are those mechanisms which are integral to program actions, such as staging, linking and bundling (grouping) of actions together so they progress at the same time. External assurances are those tools which may be applied to the program, such as including legislation, regulations, or contractual arrangements. Eventually, the assurances package will consist of several related components:

- A programmatic implementation plan or agreement
- Program wide assurances, including a Program oversight and management structure
- Specific assurances for Program elements and actions
- Contingency response process

Over the long term, assurances will also be provided through the Conservation Strategy and the Comprehensive Monitoring Plan, both discussed elsewhere in this *Revised Phase II Report*.

Stage 1

1999 (Pre-ROD) Assurances Actions

Not all of the assurance components will be fully developed prior to beginning Stage 1 implementation. Therefore, CALFED and stakeholders will need to continue work in Stage 1 to complete the long term Assurances Package. In Prior to Stage 1, the following steps will be taken

to further develop the assurances package:

1. ~~Finalize coordination among agencies or agreement~~**Complete a decision on new entity for implementation of the ERP (yr 1-3)**~~an overall CALFED management structure.~~ This decision will reflect the manner in which the overall CALFED program is managed and coordinated. It will also assign responsibilities for each of the program's elements to a new entity, existing entity, or combination of entities. Legislative recommendations will be made, if necessary.
2. ~~Refine conservation strategy (yr 1-3); e.g., and develop mechanisms to allow incidental take, where necessary, for those actions identified in the ROD to be completed during Stage 1~~**Complete a decision on an ERP entity.** Over the past two years, stakeholders have done considerable work on the need for a separate entity to carry out the ERP. A high degree of consensus among stakeholders has been reached on the need for a new organization to carry out the many new ERP tasks. The nature and specifics of an ERP entity will be decided, and legislative recommendations made if necessary.
3. ~~Recommend legislation, if necessary, to implement new institutional arrangements or facilitate program implementation (yr 2-3)~~**Complete the Conservation Strategy.** The Strategy will be mitigations and actions for species recovery, and will provide the framework for incidental take associated with Stage I actions. (See Page ____)
4. ~~Incorporate~~**Complete the final State Board's water rights decision for allocation of responsibility to meet flow requirements for Agricultural Water Quality Control Use Efficiency Strategic Plan 95-IWR6 (May 1995) in water transfer and operational rules (yrs 1-2).** (See Page ____)
5. ~~Implement~~**Develop an environmental documentation and permit coordination process (yr 1-7)**~~operational plan for water allocation.~~ The plan will move beyond the State Board's water rights decision for allocation of responsibility to meet flow requirements for Water Quality Control Plan 95-IWR, and will be consistent with all regulatory requirements.
- 6.

~~Assurances in Stage 1 are in many cases provided in~~**Identify the way that actions have been selected and proposed for implementation**~~first group of Stage I projects, and by linkage and integration with other Stage 1 actions~~**implement an environmental documentation and permit coordination process.** Certain Stage I projects have little controversy associated with them, and could move forward quickly. To enable these projects to move forward with a minimum of delay, a process to streamline or consolidate permitting and CEQA/NEPA requirements will be implemented.

7. **Complete a Programmatic Section 404 Assurance.** This programmatic document will present a clearly-defined 404 process with appropriate decision criteria. (See Page ____)

8. **Complete a recommendation on an Urban Conservation Certification entity, and recommend legislation, if necessary.** A decision will be made on what existing or new entity will certify urban water conservation plans for adequacy.
9. **Complete strategic plans for each program element.** Each of the program's elements will complete a plan detailing: 1) Performance objectives and standards; 2) Stage I actions; 3) Financing; 4) Recommended governance; and 5) Key milestones and decision points. The plans will give stakeholders, agencies and the public a complete picture of what can be expected from each part of the program.
10. **Development of a process to provide linkages or bundling between program actions.** A process on which to base program ties will be developed, taking into account types of measures, timing and ways to bundle projects (see discussion below).

Stage I Assurances

Assurances in Stage 1 may be included in the way that actions are selected and proposed for implementation, and by linkage and integration with other Stage 1 actions. An example is an action to establish the Clearinghouse in the Water Transfer Program which is proposed as an assurance that water transfer transactions and potential impacts will be fully disclosed.

The concept of linkage provides that actions of one element will not be implemented unless linked actions in a different element are also implemented. Bundling (grouping) refers to the idea of putting actions from different program elements into one distinct project for purposes of CEQA/NEPA compliance, contractual relationships, or other permit requirements phase. Thus, no one set of actions from a particular element would be implemented without counterpart actions from other elements also being implemented.

Several means of linking or bundling projects have been discussed. They include grouping projects that may be completed within a similar time period; tying projects of interest to each party through a shared CEQA/NEPA process; and grouping projects that are geographically-related.

Assurances will also be provided by conditional decision making. A decision is conditional if it can only be made after a specific set of events has occurred or specified criteria have been met. This performance-based method can also be applied to project staging, i.e. a project or set of projects does not move forward until pre-agreed performance criteria are met.

Additionally, since in Stage 1 the program is dealing with short-term implementation efforts (perhaps of 2 or 3 sets of bundled actions over a seven year time frame) there will be frequent and periodic checkpoints at which parties can determine whether the program is meeting their

needs and expectations. Effectively, the commitment of all interested parties will not have to be any longer than the current set of bundled actions requires for permitting and implementation. This reduces the need to develop long term assurances prior to the beginning of Stage 1.

Program Management and Governance

There are two distinct assurance questions related assurance questions in regard to program management and governance. First, how will the program as a whole be implemented, managed and governed? (Is CALFED the appropriate entity for program management and is the structure adequate or is a new arrangement needed?) Second, how will the ERP specifically portion of the program be governed and managed? The working premise is that CALFED will continue. Currently, efforts are underway to function as the general Program manager convene a panel of experts and provide oversight and policy guidance for program implementation practitioners in interagency programs to evaluate the CALFED program's management needs, hold a public symposium, and prepare a report to the CALFED agencies, stakeholders and the Legislature. These efforts will be added to the large amount of work already done by stakeholders on the ERP entity to prepare a recommendation to resolve these issues.

Some type of general Program manager will be needed to provide oversight and policy guidance for program implementation. A major oversight function will be to determine when program implementation milestones or performance measures have (or have not) been achieved and making the necessary reports or findings so that the program can move on to the next stage of implementation. Other oversight functions will include development of program budgets, project prioritization, and inter agency coordination. Also, CALFED will be called upon to make the necessary decisions and program adjustments due to unforeseen or uncontrollable events, as described in the contingency response process.

However, experience with the existing structure suggests that there are problems, which need to be resolved in order to assure that the CALFED program is successfully implemented. Some of these problems include:

the fact that CALFED was created to create a long-term plan, not to administer a multi-billion dollar program; that CALFED lacks any basic administrative authorities; and that there is no permanent decision-making protocol.

Given the range and scope of the decisions that CALFED implementors will face, this last point is key. Much of the CALFED program is based on staged decisionmaking and adaptive management. Without timely and decisive decisionmaking, the entire program will not succeed.

Some of the decisions that will be needed to insure the program's success are:

- **Planning versus Implementation** - CALFED was created specifically to create Stage II decisions on water quality and conveyance, using expert advice, to determine the need for an isolated conveyance; these decisions may be necessary to achieve the Program's objective of continuous improvement in water quality and to maintain a long-term plan. However, plan implementation poses significant new challenges that the current arrangement was not designed to deal with trajectory towards recovery for endangered species.
- **Stage I decisions on adaptive management for ecosystem restoration.** The entire ERP is structured on the premise of adaptive management, a particular approach for future decisionmaking. For example, is a specified plan or treatment working, or will additional measures need to be taken?
- **Maintaining proper balance among all of the water management tools to achieve the Program's water supply reliability objectives and comply with Clean Water Act Section 404 for storage.**

Without effective decisionmaking on these and numerous other difficult CALFED issues, the program cannot succeed. Whether by a new governmental entity, or some mix of the existing CALFED structural components, these decisions will have to be made. Typically this type of high-level decisionmaking is done at the highest departmental, or perhaps cabinet level. It is often based on the best scientific information from advisory or other formal scientific bodies.

When implementation of the CALFED program occurs, there are a number of inescapable duties that will be required under the program besides decisionmaking. Listed below are a number of such duties, and the examples of organization types that can carry them out:

1. **Coordinate Program Actions** - Within the CALFED programs, many actions must coordinate with other aspects of the program. Examples would include ecosystem restoration coordinating with setback levees in the Levee Program, or Watershed Program actions affecting Water Quality. Projects may take several years to complete, and may involve a number of different agencies. Models for this type of duty are typically executive levels at state or federal agencies.
2. **Budget Management** - This category of activities includes allocating resources to program activities, prioritizing when activities are funded, and tracking expended funds. These activities are usually carried out at the policy level by department-level executives, and at the implementation level by specialized administrative staffs within agencies. Policy-level decisions could be carried out by a board or similar group, with some loss of efficiency.
3. **Assignment of responsibilities and corrective actions** - For any type of

program, the determination of who does what and when is basic. CALFED will face this question often during implementation. Along with this goes the requirement to take corrective actions when a contractor or assignee is not performing adequately. This is typically an executive function carried out by a department in government, or in some cases a board.

4. **Stakeholder Communication** - Given the high stakeholder interest in the CALFED program, maintaining clear and open communications with stakeholders is a necessity. Formal stakeholder input is often obtained from appointed advisory boards, with members appointed by the executive and sometimes the legislative branches. More direct input comes from governing boards made up of stakeholder members, but these usually include fewer stakeholders, and are often less-efficient than the advisory board/department model.
5. **Legislative Coordination and Program Responsibility** - Both Congress and the Legislature will need to look to some entity as responsible for CALFED successes or failures. Because much of the program will be dealt with by legislative bodies, there will need to be a coordinated method of addressing them. Also, the public will expect that there is some type of appeals or hearings mechanism for program actions that may directly affect them. Legislative coordination is typically handled by department executives operating through specialized staffs. Boards and councils are often ineffective in addressing legislative concerns. However, appointed boards are often used as points of contact with concerned citizens.
6. **Project Implementation** - CALFED encompasses a huge array of project actions. These involve potentially much larger cash flows, addressing demanding implementation schedules, interacting with affected stakeholders, local entities, and regulatory issues in new ways, and potentially greater legal liabilities. Many of these actions have traditionally been carried out by existing line agencies of the federal or state governments. It may be appropriate in many cases that these duties remain with their traditional agencies. However, duties that have not been directly associated with any department or agency in the past may need to be done by a new organization, or be assigned to an existing one. New organizations with a specific program focus could include a number of models, from a new government department to appointed boards, to quasi-public organizations. It must be kept in mind, however, that many of the other duties listed above would need to be carried out by any new type of organization as well.
7. **Program Administration** - ~~CALFED does not exist as a legal entity; it has no independent power to receive appropriations, hire staff, establish~~ **Environmental Review** - Given the location for housing number of actions that CALFED contains, there will be a Program issue contracts, and other

~~basic administrative functions~~ large and continuing need to satisfy environmental permitting, CEQA and NEPA requirements.

~~Many stakeholders believe that the best means of assuring the achievement of environmental improvements in the Bay-Delta system is to endow an environmental trustee with the financial means, legal rights, authorities, and discretion needed to carry out the CALFED ecosystem program. At the same time, the regulatory authorities of existing agencies to protect the ecosystem will not be weakened or altered. The creation of such an environmental trustee could increase accountability, simplify decision making, encourage environmental efficiency, assure flexibility, and expand participation.~~

Specific Stage 1 Program Element Assurances

~~In addition to the usage of linked and bundled actions as an assurances mechanism, each of the major program component or elements requires some more specific assurances. These are summarized in Attachment Etthe draft Assurances Plan.~~

Contingency Response Process

~~The contingency response process is to be used when elements of the solution cannot be implemented or operated as agreed. Decision Making Responsibility and Input - CALFED currently receives input through a wide variety of pathways, including the Bay Delta Advisory Council and its work groups. There is a need to review and potentially modify the input process to address stakeholder concerns regarding overall Program governance. The water policy decisions CALFED is working to resolve are also addressed in the legislative process, with a great deal of both formal and informal interaction between the two. Stakeholder participation at the program level can be provided by a new or reconstituted advisory committee such as BDAC. This role could be expanded from its current limited advisory capacity to more active involvement in making findings necessary to advance the program to the next stage or in preparing and adopting reports to the Legislature and/or Congress.~~

~~Decision Making Protocol - CALFED, as an ad-hoc planning entity, has not established a permanent decision-making protocol. While it is generally agreed that participating agencies will not give up any independent decision-making authorities to a CALFED governance entity, this leaves a broad range of Program policy and implementation issues on the table for resolution as the Program moves forward. It is likely to become increasingly important to resolved issues in a clear and unambiguous way through a formal consensus process, majority rule, or other option.~~

~~This will affect its long-term ability to develop a coherent program, and carry out its duties in an efficient manner. It is likely to become increasingly important to resolved issues in a clear~~ While this may be considered a subset of Project Coordination, the scope and unambiguous

way through a formal consensus process, majority rule, or other option criticality of the job need to be highlighted. This work is now typically done by specialized department staff, often contracting with private consultants. However, this is done perhaps equally well by appointed boards working through their own specialized staff.

8. **Decision Making Responsibility Project Management and Input Ownership -**
~~CALFED currently receives input through a wide variety of pathways. Once areas are restored to benefit the ecosystem, including and once projects have been constructed, the Bay Delta Advisory Council ongoing operation and its work groups maintenance will need to be accomplished by some entity. There is a need to review and potentially modify. Typically, these duties are handled by the input process to address stakeholder concerns regarding overall Program governance agency constructing the project, often through departments specializing in management of the type of facility, such as the Dept. - The water policy decisions CALFED is working to resolve are also addressed in the legislative process, with a great deal of both formal Of Parks and informal interaction between the two Recreation for reservoirs. Stakeholder participation at the program level can be provided by a new or reconstituted advisory committee such as BDAC Private firms are also used in this capacity. This role could As operation and maintenance can be expanded from its current limited advisory capacity to more active involvement in making findings necessary to advance the program to the next stage or in preparing and adopting reports to the Legislature and/or Congress. Over the long term, this is an important duty and decision.~~

Many stakeholders believe that of the best means of assuring the achievement of environmental improvements in the Bay-Delta system is to endow an environmental trustee with the financial means, legal rights, authorities, functions listed above could be performed under a Joint Powers Agreement (JPA), providing it was given sufficient authority and discretion needed to carry out the CALFED ecosystem program structure. At the same time, the regulatory authorities While this type of existing agencies to protect the ecosystem will arrangement has not be weakened or altered been the norm in the past, it is certainly worthy of consideration.

The creation Given the breadth of such an environmental trustee could increase accountability the CALFED program, simplify decision making, encourage environmental efficiency, assure flexibility, it may be appropriate to consider differing governance and expand participation management structures for each separate element.

Contingency Response Process

The contingency response process is to be used when elements of the solution cannot be

implemented or operated as agreed. It can provide an accountable process that promotes appropriate actions by program managers when contingencies or potentially damaging circumstances affect program functions. It would be designed to minimize program disruption, while at the same time keeping agreed upon linkages and conditions in place. A graded response process is proposed, with corrective actions for minor contingencies, significant disruptions, and catastrophes. These responses are summarized in the following table.

Category	Effects/Outcomes	Response Process
Minor	Has negligible effect on Program implementation or operation and/or Confined to single program element with low risk of affecting others and/or Requires only minor and/or temporary changes in implementation or operation of affected element	Delegated to lowest appropriate decision maker. Immediate response and resolution as deemed appropriate by decision maker. Notification to other Program managers as appropriate.
Significant	Will prevent achieving element objectives and/or May immediately affect more than one element or has potential to affect more than one element if not resolved and/or May immediately or eventually affect Program implementation or operation and/or Requires significant changes in implementation or operations on either temporary or permanent basis	If one element affected, delegated to highest appropriate decision maker in charge of implementing that element. If more than one element is affected, oversight entity will resolve. Notice to all Program managers and other affected parties. Written notice of resolution of outcome to all managers, Program administration and affected parties.
Catastrophic	Immediately halts Program implementation or operations and/or Requires changes in Program policies in order for Program to go forward	Formal process Early public notice Public hearings Stakeholder involvement Written findings
Emergency	Sudden, unexpected occurrences that pose imminent loss or damage to life, health, safety, property or essential public services and/or Requires immediate suspension of Program operations	Immediate notification of appropriate emergency management organizations. Delegated responsibility within Program to coordinate with emergency mgmt. organizations

5.54 Financing Plan

The Financial Strategy Financing Plan is a conceptual plan for funding the implementation of the preferred alternative CALFED Bay Delta Program (Program). This is a summary status report on the development of the Financial Strategy that briefly identifies financing principles, cost allocation and cost sharing considerations, and Program element cost estimates. More detail on the financial strategy is contained in Attachment F to this report. This report is not exhaustive and is intended to advance discussions on financing for Program implementation and thus will continue to be revised to reflect agency and stakeholder input. This process is not complete. The purpose of this report is to further advance discussions of financing Program implementation. In the future, materials on financing will continue to be revised to reflect agency and stakeholder input.

During Phase II of the Program, a work group appointed by BDAC identified and discussed a number of issues relating to development of the Financing Plan. The work group was formed to identify, examine, and offer recommendations concerning policy issues. In this role, the work group identified what it considered to be the most important issues relating to the Financing Plan. The work group approached the issues in an iterative manner by considering a set of financial principles proposed by staff to guide future detailed decisions on the Financing Plan. The discussions of the issues and financial principles identified by the work group contributed to this report.

Financial Issues and Principles

The financial issues and principles address public and user beneficiaries cost splits, ability to pay, crediting for previous or ongoing efforts concurrent with Program goals, establishment of the financial baseline, user fees, and allocation of program costs.

Benefits-Based Allocation

Sharing the costs of implementing the preferred alternative based on the benefits being created is the cornerstone principle of the CALFED Financial Strategy. The fundamental philosophy is that costs will be paid by the beneficiaries of the actions, as opposed to seeking payment from those who, over time, may have been responsible for causing the problems being experienced in the Bay Delta system. This does not preclude obligations for mitigating harmful impacts, if a direct, ongoing, cause and effect relationship can be established.

Some benefits created by the solution are difficult to quantify. Benefits associated with restoring ecosystem health, for example, are not measurable in the same way as the benefits of water

supply improvements. This implies that while the benefits-based approach is useful as a guide, benefits cannot be used in a strictly quantitative way to arrive at an answer regarding sharing of costs.

Public-User Splits

During Phase I of the Program, it became apparent that both public and user investments are necessary to fund the long term Program implementation. The public and user categories have also been extended to describe the character of certain types of benefits which may be produced, with an eye towards which source of funding will pay for which portions of the Program. In principle, public money will be used to fund actions which provide public benefits, and user money will be used to fund actions which create user benefits.

In addition, a broad-based revenue source will be needed to fund the common programs elements with which have broad-based, but not necessarily public, benefits. Therefore, a water diversion fee(s) is proposed that would provide a non-public revenue stream to supplement public funding for the program elements. (See User Fees section on page).

Ability to Pay

Users unable to pay the full costs of benefits received can potentially be subsidized by others or can be excluded from receiving those benefits. In accordance with CALFED's "beneficiaries pay" principle, users should pay their full share. On the other hand, there are many precedents for considering ability to pay, and apportioning cost allocations accordingly, because this approach can help meet broader social goals of economic justice, social health and welfare, economic development, and stability, which arguably benefit society as a whole. ~~Such deviations from the beneficiaries pay principle should be explicitly identified and justified.~~

Any deviations from the beneficiaries pays principle must be explicitly identified and justified, must be consistent with CALFED Program objectives, and must not undermine targeted CALFED accomplishments. Area of Origin stakeholders, for example, believe that deviation from the beneficiaries pay principle may be warranted in their case.

Crediting

Users who are actively moving forward with actions to benefit the Bay-Delta system have suggested that costs of these actions should be credited against their ultimate cost share of the Program. An interim policy granting credit for cash contributed to the Category III Program has been approved by CALFED, because it was initiated as part of the Bay-Delta Accord and can be

clearly identified in scope, source of funds, and benefits.

In principle, the crediting policy should be expanded to reflect payments toward other consolidated efforts to address CALFED Bay-Delta ecosystem issues. CALFED proposes that credit will be given for funds expended on programs with efforts parallel to ERP actions, after the signing of the Bay-Delta Accord, on December 15, 1994. As a general rule, funding commitments that were made before the signing of the Bay-Delta Accord would be considered part of the no-action alternative, and would be exempt from receiving credit. One exception may be the CVPIA Restoration Fund, which the BDAC Finance Work Group agreed in principle should receive credit for payments that occurred post-Accord and contribute to the CALFED Program. As part of the long-term crediting policy, many additional details must be agreed upon, including types of payments to be credited, methods of crediting, consideration of the timing of payments, and others.

Financial Baseline

There is a wide spectrum of views as to how the costs of the ERP should be shared that is based in part on differing views as to the starting point or "baseline" from which ecosystem improvements should be viewed. If such a baseline level were known, then restoration to that baseline level could be considered mitigation for past acts, while restoration above the baseline level could be considered enhancement to the ecosystem. Traditionally, mitigation actions are paid by those whose acts caused the need for the mitigation, while enhancement has been viewed as a responsibility of the general public. Unfortunately, no such baseline definition has been agreed upon, and the ERP does not define a baseline in determining the goals and targets for restoration activities.

CALFED proposes that the baseline will begin with the signing of the Bay-Delta Accord on December 15, 1994. This date is consistent with the proposed starting date for crediting. Any detrimental actions taken prior to this would be considered past acts, and anything subsequent to the signing of the Accord would be viewed as ongoing impacts. As a CALFED principle, the benefits-based approach means that any obligations for mitigation should be limited to ongoing direct impacts, as opposed to historical impacts. Mitigating current and future impacts of existing projects is a responsibility of those who derive benefits from the projects. CALFED rejects the concept of reparations for damages based on past acts for two key reasons.

First, it is not possible to accurately apportion the blame for the degradation of the Delta on any particular user or group. The Delta ecosystem has been significantly degraded since the mid-1800's. While it is true that diverting water from and above the Delta has had a detrimental impact, many other human activities have also affected the Delta, and it is impossible to isolate the level of damage attributable to each. As a result, the amount on any such reparations would be arbitrary.

Second, it is destructive to the solution process. To try to place blame for past acts and to assess arbitrary amounts on water users in order to fund ecosystem restoration will lead to conflict, not to fixing the Delta or the ecosystem. CALFED agencies have determined that solving the problem is their priority; not finding out who caused damage.

User Fees

In order to restore and sustain ecological health and improve water management for beneficial uses of the Bay-Delta System, there are two needs that must be addressed:

- Funding for the ecosystem restoration program must be adequate to enable its successful implementation.
- In order to make appropriate resource use decisions in the future leading to a sustainable Delta system, water users must consider the full costs of their actions, including their ongoing effect on the ecosystem.

Instituting a charge on all Bay-Delta water use would work to satisfy both of the needs outlined above. The cost of water usage would better reflect ecosystem impacts and the ERP would have additional, stable funding from water users. Users should pay the real resource costs for the goods and services they use, otherwise they may use them inefficiently or wastefully. Higher prices induce greater incentives for conservation.

In addition, ecosystem restoration and watershed management activities that help recover endangered species or preclude the additional listing of species increase water supply reliability. The recovery of endangered species can ease existing export restrictions, and precluding additional species listings can prevent more stringent operational restrictions that would curtail water deliveries. In short, water users benefit from water diversions that a healthy ecosystem allows.

CALFED recommends instituting a broad-based charge on all water users in the Bay-Delta system, the proceeds of which would be used to help fund the Common Programs, including the ERP. In general, the fee should be based on population served and/or acre-feet of water diverted. This fee should encompass all watershed users, including upper watershed users such as San Francisco, East Bay MUD, Sacramento Valley and San Joaquin Valley, as well as in-Delta diverters. Substantive questions surrounding such a fee include the basis and size of the fee, whether it should be uniform or differ by user group, how it would be applied, and whether state or federal legislation may be necessary to impose and collect the fee. Other types of fees should also be identified and considered.

Cost Allocation Methods

No policy decisions have yet been made regarding the specific cost allocation techniques to use for making detailed cost allocations for program benefits. However, some CALFED agencies have historical policies relating to cost allocation techniques. Within the stakeholder community, some feel that while traditional methodologies may be applicable for conventional facilities, they may not be appropriate for use with the Program elements due to the difficulty of including non-market benefits created by the Program elements in the allocation process.

There are many possible cost allocation methods, each with its own strengths and weaknesses. There is no single best method that addresses all of the criteria in an optimal way. The remaining issues that must be resolved with respect to cost allocation relate to selection of specific methods to use, and whether allocation should take place at the level of Program as a whole, individually for each program element, or some other subset of the Program.

1999 Actions for Financing the CALFED Program

Significant effort will be necessary on financing the CALFED Program to ensure successful funding throughout Stage 1. Federal, State, and User funding will be necessary, and in order to succeed in funding the Program, the details on exactly how to obtain and bring funds to bear will need to be worked out prior to the Record of Decision. The following actions represent the priority for 1999 for financing the Program.

- **Refine cost estimates** - The cost estimates included in this report for Stage 1 are a first-cut attempt. During 1999, these numbers will need to be refined as more detail is obtained about the specific projects that will take place during Stage 1. In addition, cost estimates will need to be developed for operation & maintenance and included in the cost table.
- **Coordination Plan** - Determine the availability of existing funding sources and coordinate the CALFED Financing Plan with these sources of funding.
- **Beneficiary Pays** - The benefits for each program area need to be defined. CALFED will work with stakeholders and legislature to develop an explicit mechanism by which beneficiaries will be identified and costs will be allocated.
- **Crediting** - The details surrounding repayment or crediting against user fees will need to be worked out. This includes determining who will receive credit for payments contributed to the CALFED Program after the signing of the Accord.
- **Seek Federal Authorization/Appropriation** - This will be an ongoing process

throughout Stage 1, but the focus in 1999 should be on the FY 2000 Budget.

- **State Bond Funding** - A Program of this magnitude will require significant levels of funding. Some of this funding will need to come in the form of a State Bond. In 1999, the details of what a bond measure for CALFED would contain will need to be worked out. Likely steps would be to build from the example of Prop 204 and the efforts towards a water bond for 1998. Significant progress will need to be made in 1999 on details such as the amount of money requested, the schedule for repayments, and specifics surrounding what the money would be used to fund.
- **Finalize Cost Share Agreements** - Cost sharing agreements will need to be completed during 1999. This will involve a decision surrounding the cost allocation methodology that is selected (as discussed above in the *Cost Allocation Methods* section), and the role that this will take in cost sharing for the Program.
- **User Fees** - Prior to the Record of Decision, it will be necessary to design and obtain authority to collect a broad-based Bay-Delta watershed diversion fee. Legislative consideration to obtain this authority may also be necessary. The details of such a fee, which could be based on population served and/or acre-feet of water diverted, must be completed by the end of 1999. Other types of fees should also be identified and considered.

Cost Estimates

Subsequent to release of the draft Programmatic EIR/EIS in March 1998, Program staff developed preliminary cost estimates and conceptual cost sharing tables to stimulate further discussion and to advance the consensus process. A This first-cut attempt at estimating the costs of the program for Stage 1 (first 7 years) is included here, but it is a rough estimate of costs, not a detailed or final report on costs. In addition, the Federal/State/User cost share in this table is an example of what a final cost share might look like, but does not reflect a policy or proposal by CALFED for cost sharing for the Program. The cost estimates in the following table exclude interest, inflation, O&M, individual State and Federal agency costs, and CALFED (or other coordinated entity) management/ overhead costs. More detailed information on cost estimates for the Program can be found in the Financing Plan Appendix to this report.

ESTIMATED CALFED STAGE 1 PROGRAM AND CAPITAL COSTS IN MILLIONS¹

PROGRAM AREA²	STATE	FEDERAL	USER	TOTAL
Ecosystem Restoration ³	390	375 ⁴	200	965
Conservation	100	100	600	800
Recycling	250	250	500	1,000
Watershed Management	70	70	130	270
Water Quality	85	85	80	250
Delta Levees ⁵	80	140	30	250
Storage (off-stream, on-stream & conjunctive use)	70	50	110	230 ⁶
Conveyance	190	200	285	675 ⁷
TOTAL	1,235	1,280	1,925	4,440⁸

1 The Federal/State/User cost shares are for discussion purposes only. The costs should first be allocated before cost shares can be represented accurately.

2 Includes all CALFED program areas except Water Transfers which has no anticipated capital costs.

3 This includes Prop. 204 (State), Federal Bay-Delta appropriation and CVPIA water and energy funds (Federal), and CVPIA Restoration Fund (User) for seven years. A policy issue exists regarding the need for expanded user fees to pay for future ecosystem restoration and Watershed Management.

4 CVPIA water and energy funds are the only pre-existing federal and/or state programs included in this table.

5 The Delta Levees cost share is consistent with the Water Development Act of 1996 (PL 104-303, Sect. 202), the pre-existing federal cost share for flood control.

6 Includes South of Delta groundwater (145), North of Delta groundwater (15), surface storage pre-permitting and EIR/EIS compliance work only (70).

7 Includes South Delta Improvements (408), North Delta Improvements (195), Isolated Facility studies (72).

8 CALFED (or other coordination entity) management/overhead costs and other State and Federal agency costs are not included. O&M and interest are also not included.

5.65 Comprehensive Monitoring, Assessment and Research Program (CMARP)

Introduction

The CALFED Bay/Delta Program is organized around the concept of adaptive management because there is incomplete knowledge of how the ecosystem functions and the effects of individual project actions on populations and processes. Monitoring key system functions (or indicators), completing focused research to obtain better understanding, and staging implementation based on information gained are all central to the adaptive management process. The process necessarily includes numerous assessment and feedback loops so that management decisions are based on the best and most current information. This process entails an institutional framework to ensure that the correct questions are identified for monitoring and research actions, that monitoring and research are conducted appropriately, that the data collected and obtained are stored properly and available to those with an interest, and that relevant information is developed from the data obtained to further the incremental process of adaptive management. The Comprehensive Monitoring, Assessment and Research Program (CMARP) has been charged with developing recommendations to meet these needs. ~~CMARP recommendations will be presented to the CALFED Policy Group in February 1999.~~

Scope

The scope of CMARP includes all of the CALFED Bay/Delta common program elements (i.e., ecosystem restoration, water quality, watershed management, levee stability, water transfers and water use efficiency), as well as other CALFED programs including restoration coordination and the Conservation Strategy. The CMARP scope also includes the monitoring assessment and research needs of CALFED member agencies. The recommended CMARP will include organizational options to ensure that monitoring, assessment, and research needs are:

- Identified
- Coordinated to provide comprehensive system-wide coverage
- Performed by the most appropriate party
- Completed in a comparable manner by all parties
- Accomplished with minimum redundancy and optimum efficiency and effectiveness

The CMARP must also ensure that results from the monitoring are:

- Interpreted

- Made readily available to all interested parties in a timely manner
- Incorporated as feedback to facilitate adaptive management

The scope of CMARP includes both institutional and environmental considerations. It seeks to balance specific knowledge needs of water managers and the public versus an understanding of ecosystem processes and what can actually be obtained and measured from the field. For example, CALFED agencies presently monitor the abundance of several key species and environmental attributes such as streamflow at the State and federal diversion facilities in the Delta to understand better what is entrained, when, how many, during what life stage and under what kind of environmental conditions. Although much of this monitoring is designed to address institutional needs, limits on knowledge obtained are based on limitations of monitoring design which in turn are limited by the physical system to be monitored. Thus, the programmatic scope of a monitoring and research program must consider both institutional needs and environmental considerations and should maintain sufficient flexibility to respond to both as they change over time.

CALFED has determined that monitoring, assessment, and applied research efforts are a critical component of the adaptive management process, and should be integral to all program elements. The application of CMARP will be very different for individual CALFED programs. However, each program element has similar needs that include gathering and assessing data. In addition, the CMARP must also address the monitoring and assessment needs of the CALFED Conservation Strategy, as well as any mitigation required as a result of CALFED program actions.

Restoration coordination projects require special consideration. A requirement for restoration coordination funding is that project proposals contain monitoring elements to determine if stated objectives have been met and to provide guidance for assessing future rehabilitation needs. CMARP will include recommendations to ensure that monitoring data from all these projects are technically sound, broadly usable, and provide meaningful information to guide future actions.

From a CALFED agency perspective, the comprehensive program includes such disparate activities as real-time monitoring of fish distribution, compliance water quality monitoring, the Vernalis Adaptive Management Program, levee integrity evaluation, and a number of special monitoring and research projects related to each agency's mission.

The CMARP Plan will take into consideration the broad variety of factors that can affect the environment, its physical structure, chemical makeup and biotic communities. The recommended program will necessarily be limited to monitoring only a small fraction of the possible physical chemical, and biological, attributes of the environment. Conceptual modeling will play a key role in helping decide which attributes to monitor.

Objectives

Objectives have been established for CMARP's monitoring and assessment and research functions that are consistent with the primary CMARP goal of supporting the general CALFED structure, and in particular the adaptive management strategy adopted by CALFED.

Monitoring and Assessment Program Objectives

1. Provide information necessary to management necessary to evaluate the effectiveness of program actions and to support ongoing adaptive management actions
2. Describe conditions in the Bay-Delta and its watershed on appropriate temporal and spatial scales
3. Evaluate trends in the measures of environmental conditions
4. Identify the major factors that may explain the observed trends
5. Analyze data and report results to stakeholders and agencies on a timely basis

Research Program Objectives

1. Build an understanding of physical, chemical and biological processes in the Bay-Delta and its watershed that are relevant to CALFED program actions
2. Provide information useful in evaluating the effectiveness of existing monitoring protocols and the appropriateness of environmental attributes
3. Test causal relationships among environmental variables identified in conceptual models
4. Reduce areas of scientific uncertainty regarding management actions
5. Incorporate relevant new information from all sources
6. Revise conceptual models as understanding of the system increases

Program Activities

The CMARP development process involves the completion of several specific tasks involving activities shown below. Accountability and efficiency are critical components of the overall program.

1. **Identify the goals, objectives and needs of CALFED Common Programs, Related Programs, and Agency Major Program Goals and Objectives.**
2. **Develop a conceptual framework** that focuses on development of explicit conceptual models for use in designing monitoring and research programs. (This task is being accomplished in coordination with monitoring and research

programs from Puget Sound, Chesapeake Bay and South Florida).

3. **Monitoring program design**
 - Inventory existing monitoring programs
 - Develop monitoring elements (There are 6 elements and 13 sub-elements)
 - Develop a process for data management
 - Develop a process for data analysis and monitoring
 - Restoration coordination monitoring institutional process
4. **Design a CALFED focused research program** to investigate causes and trends, reduce areas of scientific uncertainty, and corroborate relationships in conceptual models.
5. **Develop an institutional structure for monitoring, assessment and research** to focus on identifying institutional functions, recommend how a monitoring and research program should operate, determine funding, establish accountability, and identify its relationship to CALFED.

CALFED recognizes the need for reducing uncertainties about the factors affecting the resources of the Bay-Delta system. Although a traditional monitoring, assessment and research program will meet this need over a period of decades, CALFED needs to reduce key uncertainties at a more rapid rate to meet program goals. Therefore, CALFED will undertake an active program of adaptive resource management. Such a program will require a partnership between resources managers and scientists in which effects of key factors are better defined by informed management experiments. Resource managers will thereby increase chances of avoiding catastrophes and responding successfully to unexpected events. Informed adaptive experiments require policy-level recognition and acceptance of some risks to the resources.

5.76 Adaptive Management

No long term plan for management of a system as complex as the Bay-Delta can predict exactly how the system will respond to Program efforts or foresee events such as earthquakes, climate change, or the introduction of new species to the system. Adaptive management, as an essential Program concept, acknowledges that there is a need to constantly monitor the system and adapt the actions that are taken to restore ecological health and improve water management. These adaptations will be necessary as conditions change and as more is learned about the system and how it responds. The Program's objectives will remain fixed over time, but the actions may be adjusted to assure that the solution is durable.

The concept of adaptive management is an essential part of every CALFED Program element, as well. The concept of adaptive management can be illustrated as applied to the Ecosystem

Restoration Program element as shown in the following section.

Because the Bay-Delta ecosystem is large, complex, diverse and variable, it is impossible to know with certainty how it will respond to implementation of the ERP and other Program components. And although much is known about how the Bay-Delta functions, there are still significant information gaps that hamper the ability to sufficiently define problems and design restoration actions to address them. To account for this uncertainty, the ERP strategic plan outlines an adaptive management approach to restoring and managing the Bay-Delta ecosystem. An adaptive management approach acknowledges the uncertainty inherent in restoring and managing a natural system as large and complex as the Bay-Delta by designing and monitoring restoration actions so that they improve the understanding of the system while simultaneously restoring it. This approach allows revised restoration activities or better designed future restoration actions based upon the information learned from projects implemented earlier. It also provides the flexibility required to respond to changing Bay-Delta conditions and to identify and address resource conflicts and trade-offs. The Strategic Plan outlines the following steps as part of the adaptive management approach:

1. **Define the problem or set of problems to be addressed.** In order to design effective restoration actions, the geographic, temporal, and ecological parameters of the problem must clearly be defined. Decades of scientific study have already identified many of the problems affecting the health of the Bay-Delta ecosystem. However, for certain components of the Bay-Delta ecosystem, existing knowledge is insufficient to adequately define problems, so targeted research will be necessary to provide the information that allows the problems to be defined with greater detail.
2. **Define goals and objectives for resolving identified problems.** It is important to establish the expectations of the overall restoration program and for individual restoration actions by articulating clear restoration goals. It is also important to establish the criteria that can be used to measure success in achieving goals by defining measurable objectives. Clear goals and measurable objectives help focus and direct ecosystem restoration, they help facilitate the design of restoration actions, and they help resource managers track incremental progress toward restoration objectives.
3. **Develop conceptual models.** It is impossible to account for all of the variables that compose and animate an ecosystem as large and complex as the Bay-Delta; therefore, it is necessary to distill the most important ecosystem attributes and relationships into simplified models that can guide resource restoration and management. Conceptual models articulate hypotheses about what attributes and relationships are most important in an ecosystem. By articulating hypotheses

about causal relationships in the ecosystem, conceptual models can suggest potential restoration actions or identify critical information gaps that help target additional research.

4. **Develop and design alternative restoration or management actions.** Conceptual models will provide an assessment of the confidence we can place in potential restoration actions. For those actions about which there is confidence in how the ecosystem will respond, full-scale implementation can begin. If conceptual models suggest multiple viable restoration alternatives, pilot or demonstration projects to test the alternative hypotheses could be implemented. The resulting information will improve understanding of the ecosystem and help suggest which restoration actions are most effective in achieving restoration goals. Conceptual models can also help identify information gaps and needed targeted research.
5. **Implement restoration actions.** Restoration actions selected for implementation must address the more serious environmental problems, must be linked to conceptual models, and must provide an opportunity to enrich our knowledge of how the ecosystem operates.
6. **Monitor the ecosystem.** It is important to monitor the ecosystem to gauge how it responds to the restoration or management action. Monitoring provides the information necessary for assessing the effectiveness of a given restoration action. It also provides the data that will help improve understanding of the Bay-Delta ecosystem.
7. **Update restoration and management actions.** The information derived from monitoring data allows resource managers to evaluate restoration actions and revise or update them to be more effective in achieving restoration goals and objectives. Monitoring data can also indicate when there is a need to refine the definition of a problem or the goals and objectives.

Similar models of these seven steps can be used to develop adaptive management approaches for the other program elements.

5.87 Long-Term Implementation

The long-term implementation strategic plan for each program element will include a general plan (subject to adaptive management and the conditional decisions) for the 30-year Program implementation. The strategic plans will also consolidate the above information relating the finance package, water operating rules, governance and assurances, Stage 1 actions, conditions

and linkages, and detailed implementation plans for each program element. The plan will contain performance measures for each of the program elements.

5.98 Draft Stage 1 Environmental Compliance Strategy

CALFED's Phase III actions will involve regulatory oversight from a number of federal, state and local government agencies. Although a programmatic EIS/EIR is being prepared, most of CALFED's proposed actions will require additional environmental documentation and permitting before they can be implemented. Effectively implementing CALFED actions will require efficient processing of information needed to comply with the regulatory procedures of the different agencies and their protocols, guidelines and time lines. Just as importantly, regulatory agencies, at the local level, will need to work with CALFED staff to identify and ultimately implement opportunities which assure conformance with their regulatory procedures while meeting the requirements in a more timely and efficient manner.

CALFED proposes to develop an environmental compliance strategy which assures compliance with various regulatory requirements, such as the National Environmental Policy Act, California Environmental Quality Act, State and Federal Endangered Species Acts, Sections 401 and 404 of the Clean Water Act, National Historic Preservation Act, Coastal Zone Management Act, in a timely and efficient fashion so as to not cause unnecessary delays or preclude scheduled implementation. The strategy will be used to implement both individual actions and actions which have been bundled.

The environmental compliance strategy assumes:

1. Regulatory agencies will fulfill their jurisdictional responsibilities
2. Projects will be required to be comply with each agency's regulatory requirements
3. Regulatory agencies are receptive to undertaking a coordinated approach to issuing permits in a timely and efficient fashion

6. OTHER CONTINUING/FUTURE WORK EFFORTS

6.1 Summary of Regulatory Compliance

The March Draft Programmatic EIS/EIR described how the CALFED Bay-Delta Program proposes to achieve programmatic compliance with several federal and state laws. Specifically, the CALFED Program proposes specific actions to comply with the programmatic requirements of the National Historic Preservation Act; the Memorandum on Farmland Preservation and the Farmland Protection Policy Act; the Federal Agricultural Improvement and Reform Act of 1996 and the 1985 Food Security Act; Executive Orders 11988 (Floodplain Management), 11990 (Protection of Wetlands), and 12898 (Environmental Justice); the Federal Clean Air Act; and the Federal Climate Change consideration under NEPA. Chapter 11 of the Main Document of the March Draft Programmatic EIS/EIR contains additional information regarding compliance with applicable laws and regulations.

Chapter 11 outlined programmatic compliance actions that still need to be initiated before the Final Programmatic EIS/EIR is completed. This section indicates how the CALFED Bay-Delta Program plans to comply with the federal/state Endangered Species Acts; Fish and Wildlife Coordination Act; 404(b)(1) Guidelines (Clean Water Act); and the Coastal Zone Management Act. Further compliance steps will be taken by agencies carrying out specific projects in Phase III.

Federal/State Endangered Species Acts

The Program is developing a programmatic Species and Habitats Conservation Strategy (Strategy) for compliance with the Federal and State Endangered Species Acts and the California Natural Community Conservation Planning Act. This Strategy will integrate all of CALFED's ecosystem restoration and mitigation actions, and provide a framework for site- and project-specific compliance with the Acts. The Strategy will prescribe conservation actions for species and habitats which will increase certainty that Program actions can be implemented.

The Strategy will address a list of covered species, including all Federally and California listed, proposed, and candidate species that may be affected by the CALFED Program. The list of covered species also includes other species identified by CALFED that may be affected by the Program and for which adequate information is available. The Strategy's covered species list currently includes 206 species that occur in the Ecosystem Restoration Program's 14 Ecological Zones. Life history information is being compiled for each of the species, including, but not

limited to, current population status, distribution and habitat requirements.

The Strategy will analyze the effects of CALFED programmatic actions (beneficial, detrimental, and neutral) on the covered species and recommend measures to maximize the Program's beneficial effects, minimize the Program's adverse effects, and compensate for any unavoidable adverse effects. The Strategy will also address the protection and restoration of habitats and ecological processes within the area directly affected by the CALFED Program. Further, the Strategy will include a monitoring program, specify a process for adaptive management, and address funding for implementation of the Strategy and for addressing unforeseen circumstances.

The Strategy will not in and of itself provide "take" authorization under Federal Endangered Species Act (FESA) or the California Endangered Species Act (CESA). Rather, the Strategy will contain the necessary biological information, programmatic impact analysis and conservation measures such that the regulatory agencies can authorize incidental take through one of the following regulatory mechanisms:

- a) Under FESA: formal consultation pursuant to Section 7; permit issuance pursuant to Section 10(a)(1)(B), including the development of one or more habitat conservation plans; and/or a special rule for threatened species under Section 4(d)
- b) Under CESA: permit issuance under Section 2081
- c) Under the NCCP: through Section 2835, including the development of a natural community conservation plan

During implementation of Stage 1 actions, either the USFWS, the NMFS, or the CDFG will authorize incidental take for Stage 1 actions under the CALFED program when adequate information is available to assess the action's effects on listed or other covered species.

Fish and Wildlife Coordination Act

Under subsection 2(a) of the Fish and Wildlife Coordination Act (FWCA), federal agencies are responsible for consulting with the USFWS and the Department of Fish and Game for the purpose of conservation of wildlife resources by preventing loss and damage as well as providing for their development and improvement in connection with water-resource projects. Also within subsection 2(b) of the FWCA, the USFWS is required to report its recommendations for wildlife conservation and development and the results expected, and to describe the damage to wildlife attributable to the project and the measures proposed for mitigating or compensating for these damages.

For the programmatic FWCA report, the USFWS will provide the public with their overall

assessment of the effects of the CALFED Program and alternatives on fish and wildlife resources, providing recommendations for mitigation of adverse effects (where appropriate), and providing recommendations for implementing future (Phase III and beyond) CALFED Program actions.

The USFWS, as a member agency of the CALFED program, has provided technical assistance to the Program throughout the development of the preferred program alternative. The USFWS will complete this programmatic FWSA analysis and report its findings and recommendations prior to completion of a Final Programmatic EIS/EIR for the CALFED Program. That report will become a part of the Final Programmatic EIS/EIR.

The USFWS will continue to provide technical assistance during Program implementation. Analyses of effects on fish and wildlife will also be provided for applicable Program actions as they are being planned.

Clean Water Act Section 404

Section 404 of the Clean Water Act requires that a project proponent obtain a permit from the U.S. Army Corps of Engineers for activities that involve the discharge of dredged or fill material into waters of the United States (33 USC 1344). A 404 Permit is not required for Phase II of the Program process because no projects will be started. However, because implementation of the program will require that projects are constructed, the Program analyzed the three alternatives and the variations in light of Section 404 and used those analyses to help select a preferred alternative:

The Corps of Engineers has determined that the level of detail in the programmatic EIS/EIR for the CALFED preferred alternative will not establish a sufficient basis for a final determination of compliance with Section 404 at the time of the Record of Decision at the beginning of Stage I. In order to facilitate Section 404 permitting during Stage I, however, the Corps of Engineers, USFWS, the State of California, and CALFED staff are exploring several options. These include:

- The possibility of an early permitting process for those projects included in the first "bundles" of CALFED actions in Stage I.

- The possibility of developing a broad "programmatic" evaluation of the need for surface storage or conveyance facilities in the CALFED Program. Identifying this needs analyses could allow for a more expedited and limited 404 permit evaluation when particular projects apply for site-specific permits.

The CALFED Bay-Delta Program was established to develop a comprehensive solution to problems facing the Bay-Delta system, in the areas of ecosystem quality, water quality, water

supply reliability, and levee and channel integrity. The Program has crafted programmatic alternatives that will address these multiple concerns over an implementation period of 30 years or more. The preferred programmatic solution will likely include hundreds of individual actions combined with a carefully crafted monitoring program to guide implementation based on adaptive management. Many of these actions will involve potential impacts to wetlands and waters of the United States and will therefore require Department of the Army Permits under Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act (Section 404 Permits for short). The actions potentially range from major, highly controversial projects such as construction of new surface storage facilities to creation of new or enhanced wetlands habitat by contouring land and changing local hydrology. It is critical to the success of the Program that an effective strategy for addressing the Section 404 Permits process for this diverse range of potential actions be developed and agreed to prior to the Record of Decision for the Program.

Many stakeholders are urging that the U.S. Environmental Protection Agency and the Army Corps of Engineers issue a "programmatic" 404 permit that would assure that the CALFED solution actions would be permissible under a clearly defined process with appropriate decision criteria. Although an actual 404 permit would not be available at the time of the Record of Decision, the Corps of Engineers, USEPA, the State of California, and CALFED staff are developing a plan to facilitate Section 404 Permitting during Program Implementation. It includes:

- An early permitting process for those projects included in the first "bundles" of CALFED actions in Stage 1 of Program Implementation.
- Developing broad "programmatic 404 assurances" regarding the need for surface storage or conveyance facilities in the CALFED Program. Identifying this needs analysis will allow for a more expedited and limited 404 permit evaluation when particular projects need site-specific permits.

These efforts to set the stage for Section 404 permitting during Program implementation can also serve an important assurances function by linking various Program actions. Each Stage 1 bundle could potentially be submitted for comprehensive 404 permits covering all actions in that bundle, so that no one action could move toward implementation before the bundle as a whole is permitted. In addition, the needs analysis and performance criteria for nonstructural methods to achieve water management goals create a strong link, in the form of enforceable permit conditions, between surface storage and other tools which would assure that a balanced implementation of all available tools will take place.

Before completion of the Record of Decision the following actions would be completed:

- A Memorandum of Agreement between the Corps of Engineers, USEPA, and appropriate CALFED agencies establishing the 404 compliance strategy and

containing a programmatic 404 assurance finding on the need for storage or conveyance facilities in the Program.

- Completion of the Rough Screening Process for potential surface storage sites, which would lead to a short list of sites which would undergo detailed evaluation during Program implementation.
- Development of performance criteria for alternatives to surface storage, which would represent the limit of practicability for the purposes of the Section 404 Alternatives Analysis. These performance criteria are currently being developed as the result of several concurrent processes involving agency staffs and stakeholders for water use efficiency and water transfer actions.
- Development of a framework for the project level permits process which will be needed in the Program implementation phase. This would clarify to the extent feasible the scope of project level analysis necessary to supplement the programmatic analysis completed in Phase II, and the procedures needed to comply with the Section 404 permit process on a wide range of potential implementation actions.

The Coastal Zone Management Act

Under the Coastal Zone Management Act of 1972, coastal states are required to develop coastal zone management programs, and federal agencies are required to certify that any proposed activities within or affecting the coastal zone are consistent with the state's program. In California, the San Francisco Bay Conservation and Development Commission (BCDC) oversees the San Francisco Bay segment of California's coastal zone management program. Among other areas, BCDC also has permit jurisdiction over projects within certain waterways up to, but not including, the legally-defined Sacramento-San Joaquin Delta (east of Chipps Island) that empty into the Bay and within specific saltponds and managed wetlands.

For Phase II, the Program will prepare a Programmatic Coastal Zone Management Act Consistency Determination which will document the possible effects of the Preferred Program Alternative on coastal resources. The Consistency Determination will also document the actions that the Program will take to ensure that implementation of the Preferred Alternative is carried out in a manner consistent, to the maximum extent practicable, with CZMA and the Coastal Act. Since the March 1998 Draft Programmatic EIS/EIR did not contain a Preferred Program Alternative, the Programmatic Coastal Zone Management Act Consistency Determination for the CALFED Bay-Delta Program was not submitted to BCDC. This document will be presented to BCDC and be part of the Final Programmatic EIS/EIR.

Clean Water Act Section 303

Section 303 of the Clean Water Act requires all states to conduct triennial reviews to evaluate and, where necessary to protect the designated uses for the state's waters, revise water quality standards. In California, the State Board is the recognized entity responsible for implementing the triennial review process.

The triennial review process of Section 303 is particularly well-suited to the adaptive management approach to ecosystem protection being proposed in the CALFED Program. CALFED intends to work with the State and Regional Boards and the USEPA to assure that the implementation of the Ecosystem Restoration Program and other CALFED programs is consistent with and, where appropriate, incorporated into the ongoing regulatory programs based on Section 303.

6.2 Restoration Coordination

In December 15, 1994, the Bay-Delta Accord included a commitment by the agency and stakeholder signatories to develop and fund non-flow related ecosystem restoration actions to improve the health of the Bay-Delta ecosystem. This commitment is commonly referred to as *Category III*. Some of the specific non-flow factors identified to be addressed as part of the Category III commitment include unscreened water diversions, waste discharges and water pollution prevention, fishery impacts due to harvest and poaching, land derived salts, exotic species, fish barriers, channel alternations, loss of riparian wetlands, and other causes of estuarine habitat degradation.

Category III actions can be beneficial to the long term program regardless of the final configuration of the preferred program alternative. The Category III actions must be consistent with any alternative configuration and provide early implementation benefits. This implementation will also provide valuable information for use in adaptively managing the system in later years of the program. Category III projects must have appropriate environmental documentation, have no significant adverse cumulative impacts, and must not limit the choice of a reasonable range of alternatives.

Funding sources for near-term restoration activities include \$60 million from state Proposition 204 funds (Bay-Delta Agreement Program) and stakeholder contributions of \$31.75 million. In addition, Congress authorized \$430 million for fiscal years 1998, 1999, and 2000 to fund the Federal share of Category III and initial implementation of the ERP. In Federal fiscal year 1998, \$85 million was appropriated and in Federal fiscal year 1999, \$75 million was appropriated for Bay-Delta ecosystem restoration, a portion of which is considered Category III funding. Proposition 204 also include \$390 million for implementation of the ERP.

Projects have been selected through a 1997 Request for Proposals which resulted in the selection of 71 projects totaling more than \$85 million, through selection of twelve directed programs targeted at specific issues to be addressed by individual CALFED agencies, and through a 1998 Proposal Solicitation Package which resulted in the selection of 64 projects totaling over \$25 million. Competition has been fierce for these funds and the number of applications regularly exceeds the available funding by 10 to 1.

About three-fourths of the money was devoted to projects that restore rivers, riparian forests, wetlands, and marshes. The remainder has gone to projects such as installing fish screens to keep endangered fish from being pumped out of rivers; preventing the introduction of exotic species; and researching key questions that must be answered to implement adaptive management. Many of the ecosystem projects also provide benefits to other CALFED objectives such as water supply reliability, levee system integrity, and water quality.

As the CALFED long-term program has become more developed, the priorities and the project selection process have been revised to ensure that expenditures are consistent with the overall direction of the program and efficiently targeted at restoring the ecosystem through adaptive management.

6.3 Phase III Site-Specific Environmental Documentation

During Phase III of the CALFED Program, second-tier site-specific environmental documents will be prepared for the individual actions or site-specific projects chosen for implementation during the current Phase II process. Second-tier documents, will be prepared after certification of the Programmatic EIS/EIR to concentrate on issues specific to the individual parts of the program elements being implemented or the site chosen for the action. The second-tier documents will summarize and incorporate by reference the issues discussed in the broader program-oriented EIS/EIR and focus on the issues specific to the part of the overall program being implemented. Information presented in the second-tier EIS/EIRs will be specific to a smaller area within the CALFED Bay-Delta study area and will focus on impacts within the smaller area and individual action-level mitigation performance criteria.

7. GLOSSARY OF TERMS

AF Abbreviation for acre feet; the volume of water that would cover one acre to a depth of one foot, or 325,851 gallons of water. On average, could supply 1-2 households with water for a year. A flow of 1 cubic foot per second for a day is approximately 2 AF.

Alternative A collection of actions or action categories assembled to provide a comprehensive solution to problems in the Bay-Delta system.

AFRP Anadromous Fish Restoration Program, part of the Central Valley Project Improvement Act. The AFRP identified instream and Delta flows needed for recovery of anadromous fish.

Action A structure, operating criteria, program, regulation, policy, or restoration activity that is intended to address a problem or resolve a conflict in the Bay-Delta system.

Anadromous Fish Fish that spend a part of their life cycle in the sea and return to freshwater streams to spawn.

B(2) Water Statutory mandate to manage the water dedicated to fish and wildlife purposes pursuant to Section 3406(b)(2) of the Central Valley Project Improvement Act.

Banks Pumping Plant The State Water Project (SWP) export pumping plant in the south Delta. The plant is located downstream of Clifton Court Forebay.

BDAC The Bay-Delta Advisory Council, a 34-member federally chartered citizens' advisory committee. BDAC provides formal comment and advice to the CALFED agencies during regularly scheduled meetings.

Best Management Practices (BMP) An urban water conservation measure that the California Urban Water Conservation Council agrees to implement among member agencies. The term is also used in reference to water quality standards, watershed management activities, and others.

Carriage Water Additional flows released during export periods to ensure maintenance of water quality standards and assist with maintaining natural outflow patterns in Delta channels. For instance, a portion of transfer water released from upstream of the Delta intended for export from south Delta would be used for Delta outflow.

Central Valley Project (CVP) Federally operated water management and conveyance system that provides water to agricultural, urban, and industrial users in California. The CVP was originally authorized by legislation in 1937.

Central Valley Project Improvement Act (CVPIA) This federal legislation, signed into law on October 30, 1992, mandates major changes in the management of the federal Central Valley Project. The CVPIA puts fish and wildlife on an equal footing with agricultural, municipal, industrial, and hydropower users.

CFS Cubic feet per second.

Channel Islands Natural, unleveed land masses within Delta channels. Typically good sources of habitat.

Clifton Court Forebay The in-Delta storage used to regulate flows to the Banks Pumping Plant.

Common Delta Pool Delta provides a common resource, including fresh water supply for all Delta water users, and all those whose actions have an impact on the Delta environment share in the obligation to restore, maintain and protect Delta resources, including water supplies, water quality, and natural habitat.

~~**Common Program Element** Six programs elements for Water Use Efficiency, Water Quality, Levee System Integrity, Ecosystem Restoration, Water Transfers, and Watershed Management that are essentially the same for each of the three Phase II alternatives.~~

Conjunctive Use The operation of a groundwater basin in combination with a surface water storage and conveyance system. Water is stored in the ground water basin for later use in place of or to supplement surface supplies. Water is stored by intentionally recharging the basin during years of above-average water supply.

Conveyance A pipeline, canal, natural channel or other similar facility that transports water from one location to another.

~~**Core Actions** Actions that would be included in all CALFED Bay-Delta Program alternatives. Core actions are no longer viewed as a single set of actions. Rather, these actions are now distributed between the six common programs included in each of the three Phase II Alternatives.~~

CZMA Coastal Zone Management Act

Delta Cross Channel Existing gated structure and channel connecting the Sacramento River at Walnut Grove to the North Fork Mokelumne River. The facility was constructed as part of the CVP to control movement of Sacramento River water into the central Delta and to the south Delta export pumps. Operating criteria currently requires the gates to be closed for specific periods to keep downstream migrating fish in the Sacramento River and to prevent flooding of the central Delta.

Delta Inflow The combined water flow entering the Delta at a given time from the Sacramento River, San Joaquin River, and other tributaries.

Delta Islands Islands in the Sacramento-San Joaquin Delta protected by levees. Delta Islands provide space for numerous functions including agriculture, communities, and important infrastructure such as transmission lines, pipelines, and roadways.

Delta Outflow The net amount of water (not including tidal flows) at a given time flowing out of the Delta towards the San Francisco Bay. The Delta outflow equals Delta inflow minus the water used within the Delta and the exports from the Delta.

Demand Management Programs that seek to reduce demand for water through conservation, rate incentives, drought rationing, and other activities.

Direct Mortality The direct loss of fish associated with facilities (forebay, fish screens, and salvage facilities) for the south Delta export pumps. This direct mortality is a portion of the total fish mortality resulting from operation of the export pumps (see indirect mortality).

Diversions The action of taking water out of a river system or changing the flow of water in a system for use in another location.

Drought Conditions A time when rainfall and runoff are much less than average. One method to categorize annual rainfall is as follows, with the last two categories being drought conditions: wet, above normal, below normal, dry critical.

Dual Conveyance A means of improving conveyance across the Bay-Delta by both improving through Delta conveyance and isolating a portion of conveyance from Delta channels.

Ecosystem A recognizable, relatively homogeneous unit that includes organisms, their environment, and all the interactions among them.

Ecosystem Manager (Trustee) An entity responsible for environmental improvements in the Bay-Delta system with the financial means, legal rights, authorities, and discretion needed to carry out the Ecosystem Restoration Program (ERP).

Entrainment The process of drawing fish into diversions along with water, resulting in the loss of such fish.

ESA (Endangered Species Act) Federal (FESA) and State (CESA) legislation that provides protection for species that are in danger of extinction.

Export Water diversion from the Delta used for purposes outside the Delta.

Export-Inflow Ratio (E-I Ratio) This requirement presently limits Delta exports by the State and federal water projects to a percentage of Delta inflow. In July through January, 65% of inflow can be exported. During February through June, months most critical to fisheries, the allowable E-I ratio is reduced to 35% to help diminish reverse flows and the resulting entrainment of fish caused by south Delta export operations.

Fish Entrainment The incidental capture and loss of fish during water diversion.

Fish Migration Barriers Physical structures or behavioral barriers that keep fish within their migration route and prevent them from entering waters that are not desirable for them or their migration pattern.

Fish Salvage The process of screening fish at the south Delta export facilities and physically transporting them by truck to release in other parts of the Delta. This generally results in higher fish mortality than a more conventional fish screen where screened fish simply return to the river and continue downstream. Fish salvage is required at the export facilities since there is no flow continuing downstream to carry the fish away.

Fish Screens Physical structures placed at water diversion facilities to keep fish from getting pulled into the facility and dying there.

Flexible Operations Operation of the south Delta export pumps that would allow reducing export pumping at times critical to fish and increasing export pumping at other times. Flexible operations would allow higher or lower export rates and export-inflow ratios than prescribed by the 1995 *Water Quality Control Plan*. Pumping could deviate from currently permitted rates seasonally and on a real-time basis in response to Delta flows and fish distributions.

Groundwater Banking Storing water in the ground for use to meet demand during dry years. In-lieu Groundwater Banking replaces groundwater used by users with surface water to build up and save underground water supply for use during drought conditions.

HMP (Hazard Mitigation Plan) One of two standards referred to in the alternatives for levee flood protection. Following the flood disasters of the 1980s, HMP standards were established at 1 foot of freeboard above the 100-year flood event level.

Hood A location on the Sacramento River in the northern Delta above the major tidal influence. It has been identified as one potential location for a new diversion, if it is determined to be needed, from the Sacramento River. A new intake at this point could move more water into the central Delta or be the beginning for an isolated facility. Sacramento River water is much fresher at this location than at the export facilities and a diversion at this point may have substantially fewer impacts on some species of fish than the current diversions at the export pumps.

Hydrograph A chart or graph showing the change in flow over time for a particular stream or river.

In-Delta Storage Water storage within the Delta by converting an existing island to a reservoir. The storage can help facilitate flexible operations of the export pumps by allowing export of stored water when critical fish species are present in the south Delta.

Indirect Mortality The indirect fish losses from operating the Delta Cross Channel and south Delta export pumps. For example, fish diverted from the Sacramento River into the central and south Delta experience higher mortality through increased stress, small agricultural water diversions, predation, reduced shallow water habitat for fry, higher water temperatures, and higher residence times. This indirect mortality is a portion of the total fish mortality resulting from operation of the export pumps (see direct mortality).

In-lieu Groundwater Banking Replaces groundwater used by users with surface water to build up and save underground water supply for use during drought conditions.

Inverted Siphon A pipeline that allows water to pass beneath an obstacle in the flow path. For example, an inverted siphon could be used to allow water in a canal to pass under a Delta channel.

Isolated Conveyance Facility A canal or pipeline that transports water between two different locations while keeping it separate from Delta water.

Land Fallowing/Retirement Allowing previously irrigated agricultural land to temporarily lie idle (fallowing) or purchasing such land and allowing it to remain out of production for a variety of purposes for a long period of time.

MAF An abbreviation for million acre feet, as in 2 MAF or 2,000,000 AF.; 10,000 cfs flowing for a year is about 7 MAF.

Mine Drainage Remediation Controlling or treating polluted drainage from abandoned mines.

Meander Belt Protecting and preserving land in the vicinity of a river channel in order to allow the river to meander. Meander belts are a way to allow the development of natural habitat around a river.

Non-native Species Also called introduced species or exotic species; refers to plants and animals that originate elsewhere and are brought into a new area, where they may dominate the local species or in some way negatively impact the environment for native species.

Program Element The program elements for the Phase II Alternatives include an element for Delta conveyance, a element for storage, and the six common program elements (Water Use Efficiency, Water Quality, Levee System Integrity, Ecosystem Restoration, Water Transfers, and Watershed Management).

Old River A natural channel in the southern Delta. The channel merges with many other channels in the south Delta, passes by the south Delta export facilities and connects with the San Joaquin River at its upstream end. Much of the water approaching the export facilities flows up Old River from the central Delta. Potential improvements to the channel include a fish barrier at its upstream end to keep migrating fish in the San Joaquin River and dredging north of Clifton Court Forebay to allow more efficient flow to the export facilities.

QWEST A broad indication of the net direction and quantity of flow in the San Joaquin River at Jersey Point. This is only an indicator since there is considerable tidal exchange at this point. A positive QWEST indicates the net flow is generally in the downstream direction towards the San Francisco Bay. A negative number indicates that the net flow is generally in the upstream direction to the east. Generally, a positive QWEST is desirable for Delta flow circulation, water quality, and fisheries.

~~**Real-Time Monitoring** Continuous observation in multiple locations of biological conditions on site in order to improve management to protect fish species and allow optimal operation of the water supply system.~~

Real-Time Monitoring and Operations Continuous observation in multiple locations of biological conditions on site in order to improve management to protect fish species and allow optimal operation of the water supply system. This is an essential feature to allow flexible operations of the export pumps.

Riparian The strip of land adjacent to a natural water course such as a river or stream. Often supports vegetation that provides the important fish habitat values when growing large enough to overhang the bank.

Riverine Habitat within or alongside a river or channel.

Setback Levee A constructed embankment to prevent flooding that is positioned some distance from the edge of the river or channel. Setback levees allow wildlife habitat to develop between the levee and the river or stream.

Shallow Water Water with just enough depth to allow for sunlight penetration, plant growth, and the development of small organisms that function as fish food. Serve as spawning areas for delta smelt.

Smolt A young salmon that has assumed the silvery color of the adult and is ready to migrate to the sea.

Solution Principles Fundamental principles that guide the development and evaluation of Program alternatives. They provide an overall measure of acceptability of the alternatives.

South of Delta Storage Water storage supplied with water exported south from the Delta.

State Water Project (SWP) A California state water conveyance system that pumps water from the Delta for agricultural, urban domestic, and industrial purposes. The SWP was authorized by legislation in 1951.

TAF Thousand acre feet, as in 125 TAF equals 125,000 AF.

Take Limit The numbers of fish allowed to be lost or entrained at a water management facility before it must limit or cease operations. The numbers are set for different species by regulations.

Tracy Pumping Plant The CVP export pumping plant in the south Delta.

Terrestrial Species Types of species of animals and plants that live on or grow from the land.

Through Delta Conveyance A means of improving conveyance across the Bay-Delta by a variety of modifications to Delta channels.

Upstream Storage Any water storage upstream of the Delta supplied by the Sacramento or San Joaquin Rivers or their tributaries.

Water Conservation Those practices that encourage consumers to reduce the use of water. The extent to which these practices actually create a savings in water depends on the total or basin-wide use of water.

Water Reclamation Practices that treat and reuse water. The waste water is treated to meet health and safety standards depending on its intended use.

Water Transfers Voluntary water transactions conducted under state law and in keeping with federal regulations.

Watershed An area that drains to a particular channel or river, usually bounded peripherally by a natural divide of some kind such as a hill, ridge, or mountain.

X2 The location (measured in kilometers upstream from the Golden Gate Bridge) of 2,000 parts per million total dissolve solids. The length of time X2 must be positioned at set locations in the

estuary in each month is determined by a formula that considers the previous month's inflow to the Delta and a "Level of Development" factor, denoted by a particular year. X2 is currently used as the primary indicator in managing Delta outflows. The X2 indicator is also used to reflect a variety of biological consequences related to the magnitude of fresh water flowing downstream through the estuary and the upstream flow of salt water in the lower portion of the estuary. The outflow that determines the location of X2 also affects both the downstream transport of some organisms and the upstream movement of others and affects the overall water operations of the CVP and SWP.